Spicer® Tandem Drive Axles

SPICER®

DANA

Service Manual

Spicer® Tandem Drive Axles

AXSM-8661

September 2007

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GENUINE SPICER SERVICE PARTS

Should an axle assembly require replacement component parts, it is recommended that Spicer Heavy Axle Service Parts be used. Spicer Heavy Axle Service Parts are manufactured under the same rigid specification as are original equipment axle components. This assures the customer who uses genuine Spicer service parts, maximum reliability for a Spicer Heavy Axle assembly. They may be obtained through your vehicle manufacturer.

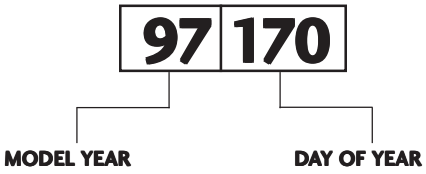
The use of non-original Spicer service parts may cause premature component failure and may void the warranty.

The items included in this book are currently being offered as service parts at the time of printing. The part numbers and illustrations are provided specifically for reference purposes only. Therefore, Spicer reserves the right to update this manual without notice or liability.

AXLE IDENTIFICATION

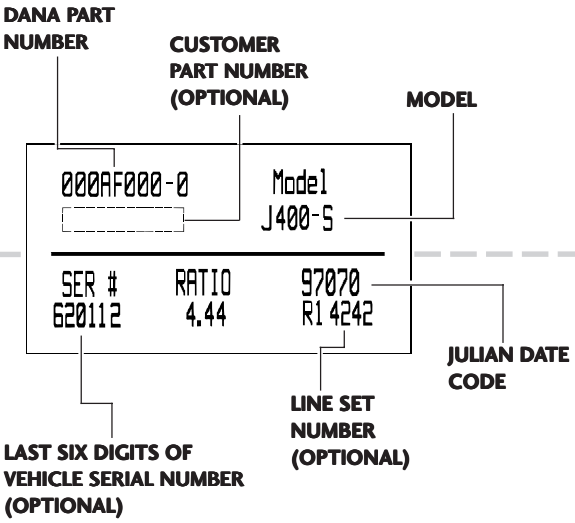
All axle assemblies are identified with two tags. One located on the differential carrier, and the other located on the right hand side of the axle housing. Two types of tags may be found on the axle, an aluminum tag that is riveted on the assembly or a coated mylar tag.

JULIAN DATE CODE

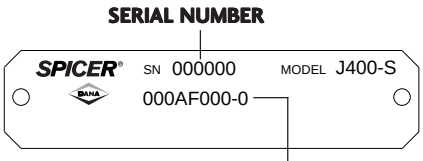


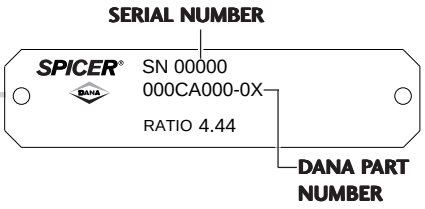
The **aluminum axle assembly tag** contains the following items: serial number, according to the julian date, Dana part number, and the model. The **mylar axle assembly tag** contains the following items: Dana part number, julian date code, axle model, and ratio. Optional items include customer part number, line set number, and the last six digits of the vehicle serial number.

The **aluminum differential carrier tag** contains the following items: serial number, according to the julian date code, the Dana part number, and ratio. The **mylar differential carrier tag** contains the following: Dana part number, julian date code, and ratio. Optional items include customer part number, line set number, and the last six digits of the vehicle serial number.

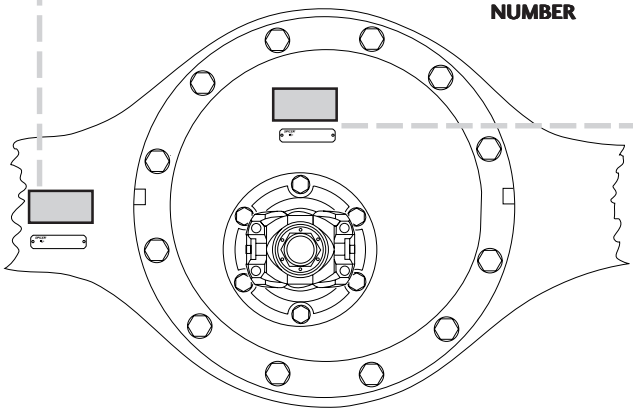


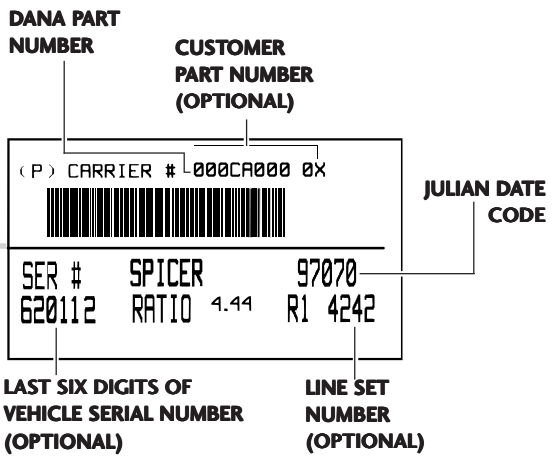
Axle Assembly Tags



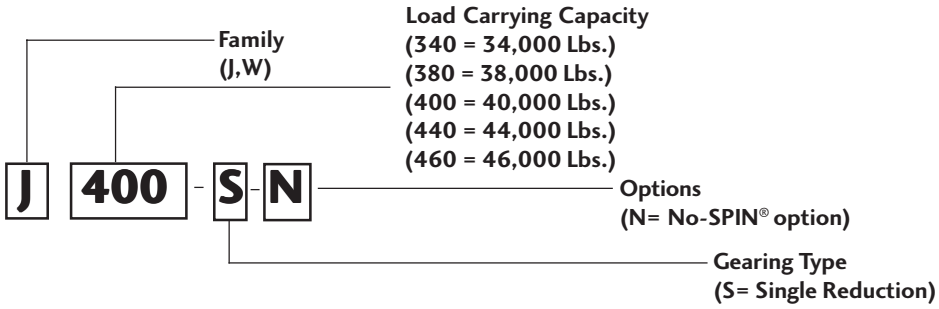


Carrier Tags





MODEL IDENTIFICATION NUMBERING SYSTEM



** No-SPIN® is a registered trademark of Tractech*

GEAR SET IDENTIFICATION

Manufacturer's Date- Date gear set was made.

Spicer Trademark- Dana Diamond and location of manufacturing facility.

047GP000- Part number of pinion. (TYPICAL)

047GR000- Part number of ring gear. (TYPICAL)

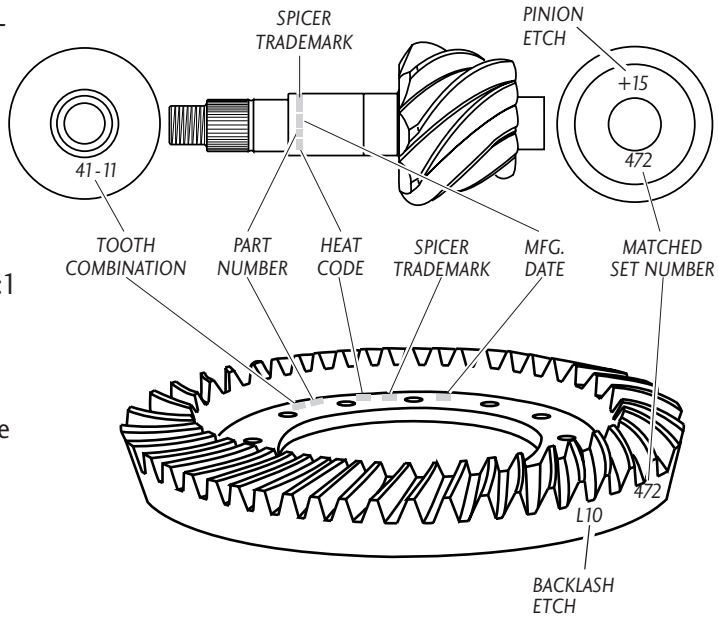
Tooth Combination(i.e. 41 -11)- Indicates the pinion has 11 teeth and the ring gear has 41 teeth which results in a 3:73:1 ratio.

Matched Set Number- Spicer ring gears and pinions are manufactured as matched sets. Both ring gear and pinion are marked with a corresponding number (i.e. 472), which identifies them as a matched set.

A gear set that does not have the same match set numbers should not be run together. If either ring gear or pinion require replacement, *a new matched set must be used.*

Backlash Etch- Indicates backlash setting for assembly.

Pinion Etch- Indicator for proper pinion position shim stack up. **See Pinion Position Section.**



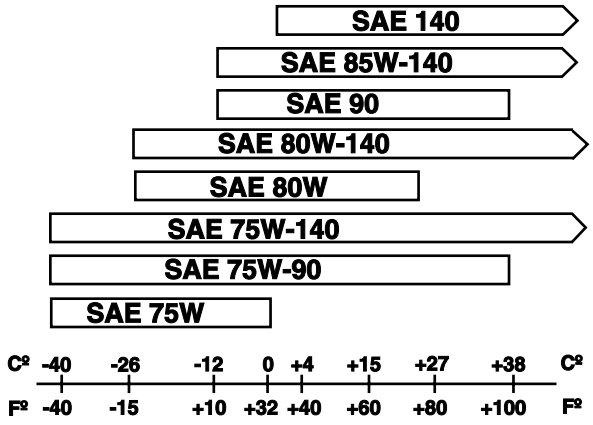
AXLE LUBRICANT RECOMMENDATIONS

To ensure proper lubrication and operating temperature, correct lubricants and lubricant levels must be obtained.

RECOMMENDED LUBRICANTS

Mineral or Synthetic based hypoid gear lubricants that meet or exceed military specification MIL-L-2105D, and API service classification GL-5, are the minimum requirements for use in Spicer medium and heavy duty drive axles.

The table below indicates which SAE viscosities are recommended for various temperature ranges the vehicle will encounter.



Ambient Air Temperature

SERVICE

Recommended lubricant change intervals are dependent on the application and operating environment. The following chart should be used to establish proper change intervals.

APPLICATION	PETROLEUM BASED		SYNTHETIC BASED**	
	MILES	INTERVAL	MILES	INTERVAL
On Highway	100,000	1 Year	250,000	3 Year
* Severe Service and On-Off Highway	50,000	1 Year	100,000	1 Year

* Severe service includes any applications operating at or near maximum GVW or GCW ratings. This includes normally wet or dusty environments, or consistent heavy load and low speed applications.

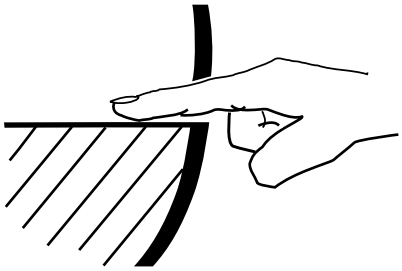
** Includes Semi-Synthetic blends that meet MIL-L-2105D specifications.

SUBMERSION OR DEEP WATER FORDING

In the event the axle assembly should become submerged in water, particularly if over the vent or breather, it is recommended that the lubricant be drained and all parts be inspected for water damage and/or contamination. Reassemble the carrier to the housing and refill with specifed gear lubricant.

AFTER OVERHAUL OR CHANGE INTERVALS

Fill the axle assembly to the bottom of housing fill hole as shown in the illustration below. It is recommended that following an overhaul, each side of the axle be jacked up seperately to approximately six inches and held into position for one minute. This procedure will allow adequate lubricant to flow into the wheel ends and help eliminate the possibility of premature damage to wheel bearings and seals. Lower the vehicle to the floor and allow ten minutes for lube to return to normal level. Check and refill assembly to bottom of fill hole to replace the lubricant that was directed into the wheel ends.



NOTE: Lubricant close enough to the bottom of the fill hole to be seen or touched is not sufficient. Lubricant must be level with the fill hole.

GENERAL PRECAUTIONS

⚠ IMPORTANT

READ THIS SECTION BEFORE STARTING ANY SERVICE PROCEDURES

GENERAL AXLE DESCRIPTION

This manual covers maintenance and rebuild procedures for the Spicer J340-S, J380-S, J400-S, W440-S and W460-S rear drive tandem axle assemblies.

The Spicer heavy duty single reduction rear drive axle is a full floating axle assembly, with a hypoid gear carrier assembly, using a High Strength Low Alloy (HSLA) steel axle housing. The hypoid pinion is straddle mounted with two tapered roller bearings behind the pinion teeth for thrust and radial loads. A pilot bearing is located on the nose of the pinion for radial load. The differential itself uses four precision forged pinion mate gears, a forged cross, and precision forged side gears.

Safety glasses should be worn at all times when assembling or disassembling axles.

SAFETY PRECAUTIONS

Proper service and repair of vehicle components is important to the safe and reliable operation of all motor vehicles. This applies particularly to driving axles such as the ones described in this manual. The procedures recommended and described in this manual are tested, effective methods for performing service operations. Follow each procedure closely, making use of both the text and illustrations. Some of these service procedures show the use of certain tools designed specifically for the operation being performed. They are shown as a preferred means of performing the operation. It is not practical to anticipate and advise the service trade of all possible alternative methods, and of all possible hazardous consequences that could occur.

Accordingly, anyone who uses a service procedure or tool different than shown must insure that their safety, and the vehicle's safety, will not be jeopardized by the service method selected.

END YOKES AND FLANGES

⚠ **CAUTION: Hammering on end yokes can close in the bearing bores or misalign yoke lugs and result in early failures of journal needle bearings or other driveline components. Serious damage can also be done internally to the ring and pinion set or pinion bearings by hammering on external parts. End yokes or companion flanges should be removed or installed using the recommended methods outlined in this manual.**

CLEANLINESS

Axle components should be steam cleaned prior to removal from the vehicle. Dirt is abrasive and will cause premature wear of otherwise serviceable parts. Service personnel should use a wash tank for thorough cleaning of parts just prior to assembly.

⚠ CAUTION

BRAKE LININGS CONTAIN NON-ASBESTOS FIBERS

BREATHING BRAKE DUST MAY BE HAZARDOUS TO YOUR HEALTH AND MAY CAUSE SERIOUS RESPIRATORY OR OTHER BODILY HARM.

AVOID CREATING DUST

DO NOT REMOVE BRAKE DRUM WITHOUT PROPER PROTECTIVE EQUIPMENT.

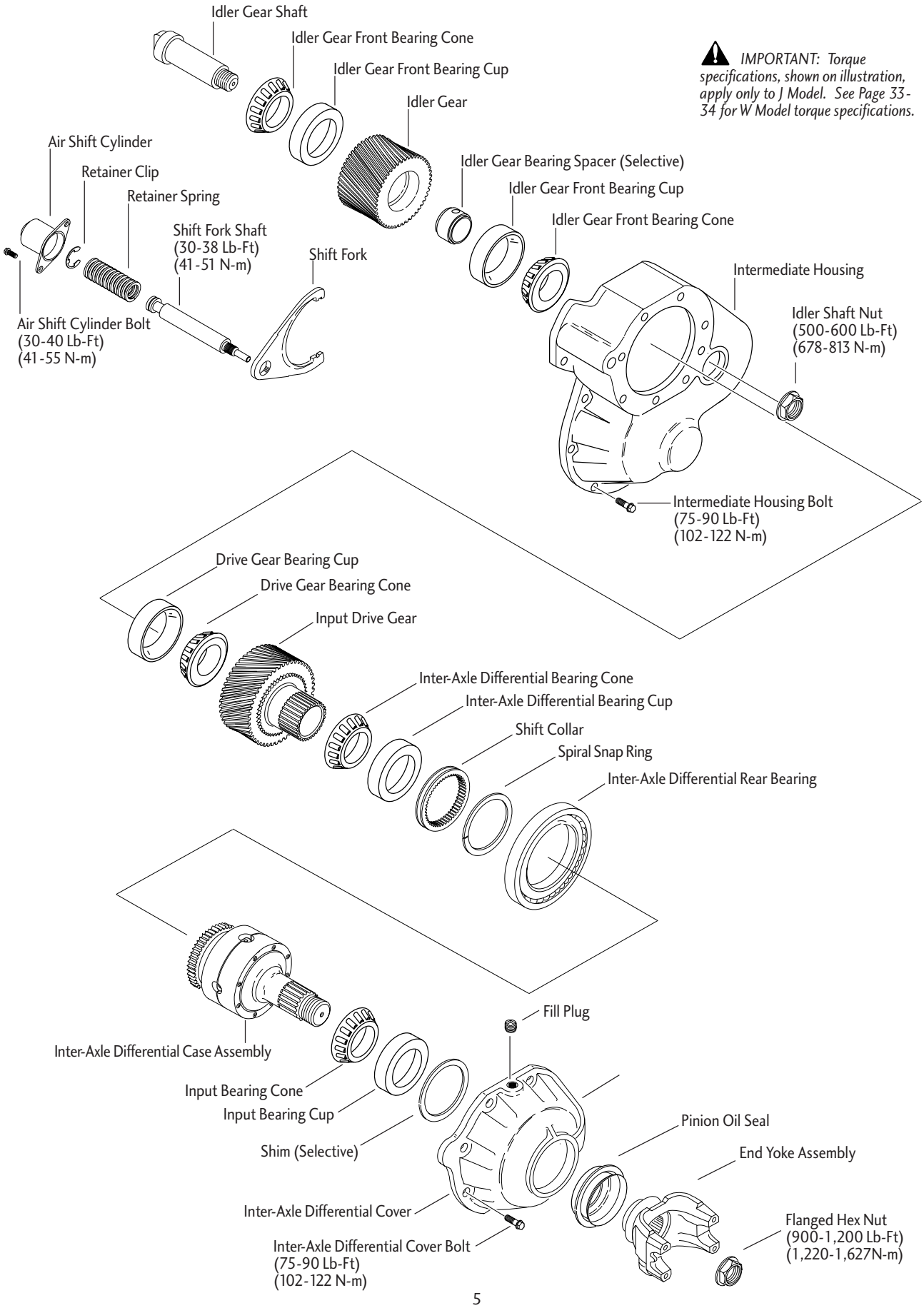
DO NOT WORK ON LININGS WITHOUT PROPER PROTECTIVE EQUIPMENT.

DO NOT REPLACE LININGS WITHOUT PROPER PROTECTIVE EQUIPMENT.

DO NOT ATTEMPT TO SAND, GRIND, CHISEL, FILE, HAMMER OR ALTER BRAKE LININGS IN ANY MANNER WITHOUT PROPER PROTECTIVE EQUIPMENT.

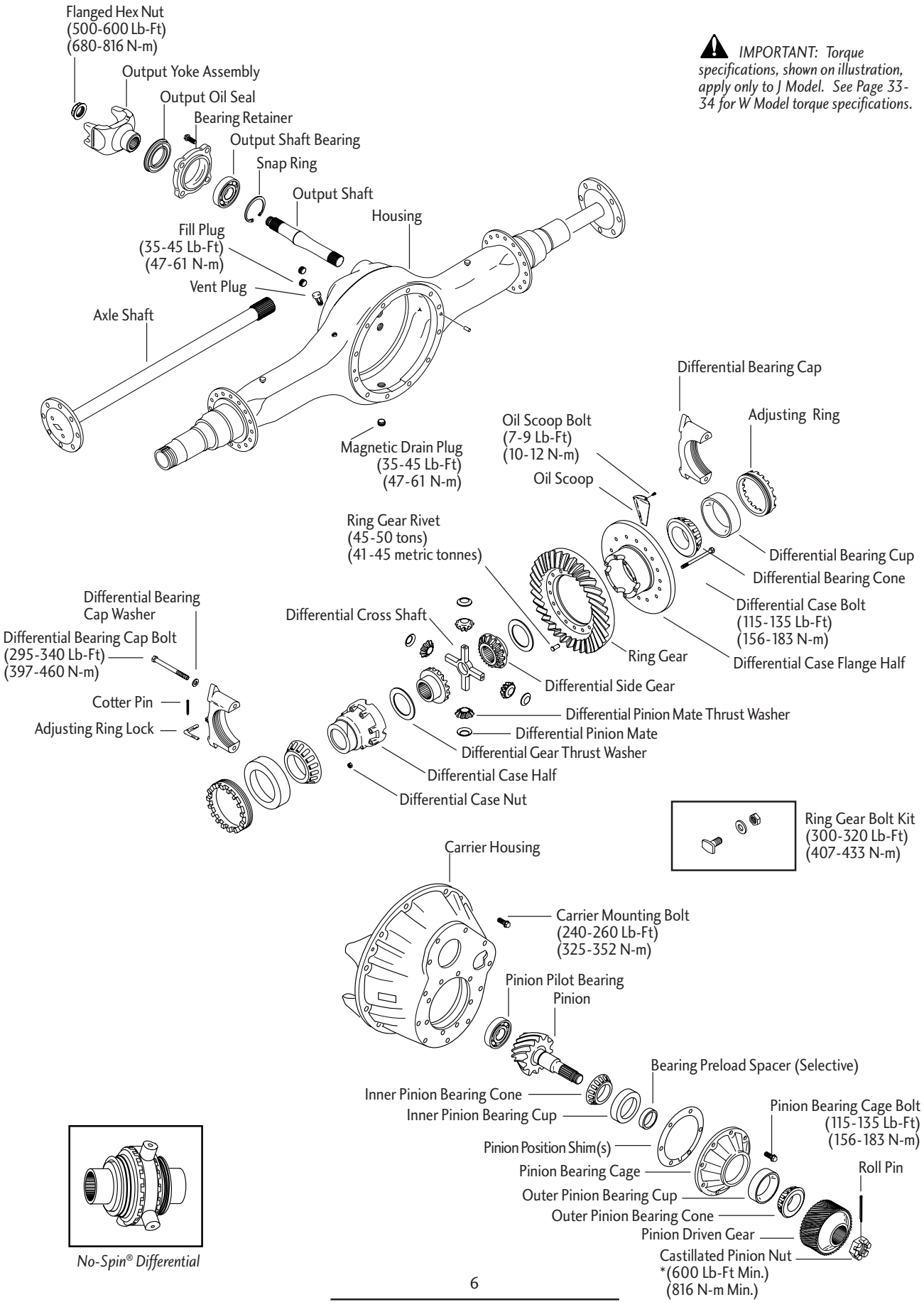
FOLLOW O.S.H.A. STANDARDS FOR PROPER PROTECTIVE DEVICES TO BE USED WHEN WORKING WITH BRAKE MATERIALS.

POWER DIVIDER COMPONENTS



⚠ *IMPORTANT: Torque specifications, shown on illustration, apply only to J Model. See Page 33-34 for W Model torque specifications.*

FORWARD REAR AXLE COMPONENTS

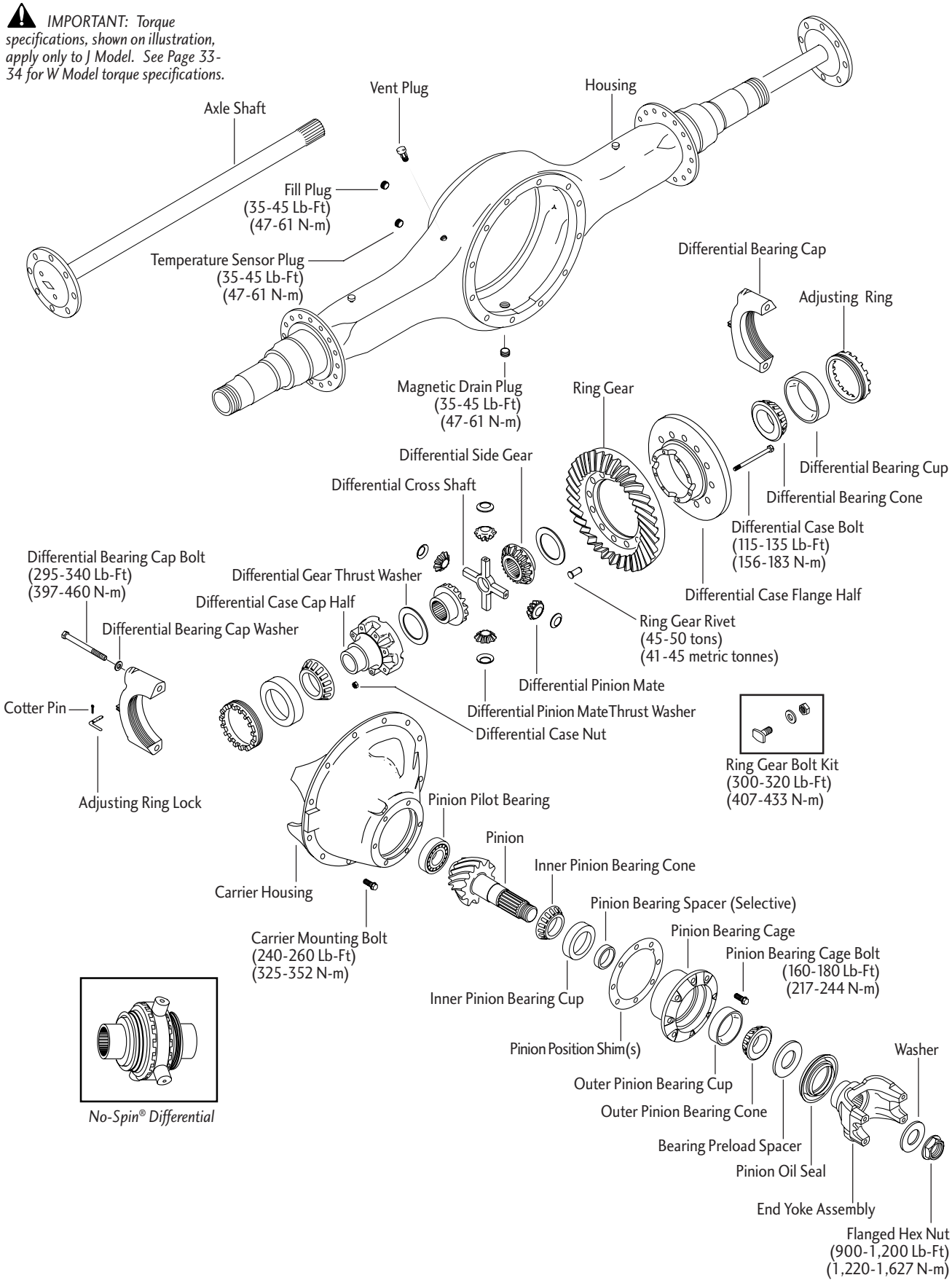


IMPORTANT: Torque specifications, shown on illustration, apply only to J Model. See Page 33-34 for W Model torque specifications.

No-Spin® Differential

REAR REAR AXLE COMPONENTS

⚠ *IMPORTANT: Torque specifications, shown on illustration, apply only to J Model. See Page 33-34 for W Model torque specifications.*



No-Spin® Differential

REMOVAL OF DIFFERENTIAL CARRIER FROM AXLE HOUSING

FORWARD REAR CARRIER (WITH POWER DIVIDER)

NOTE: Steam clean axle assembly.

1 . Block wheels.

2 . Remove axle housing drain plug and drain lubricant.

3 . Disconnect drive shafts from input and output shaft end yokes.

NOTE: If end yoke and/or seal is to be replaced, loosen flanged hex nut at this time.

4 . Remove axle shaft flange nuts.

5 . Hold a large brass drift or a brass hammer against the center of the axle shaft flange. Strike the drift with sharp blows from a large hammer or sledge until the axle shaft separates from the hub.

⚠ CAUTION: Do not strike the flange directly with a steel hammer or sledge. This may crack and splinter material, possibly causing serious or fatal injury. Do not pry or chisel axle flange away from hub or damage to sealing surfaces could occur.

6 . Remove axle shafts.

7. Disconnect air line from power divider control.

8 . Remove output shaft bearing retainer bolts. Use a soft hammer to loosen bearing retainer from axle housing. Remove bearing cage and output shaft from axle housing.

9 . Support the differential carrier assembly on a roller jack. Secure as necessary to prevent it from falling off the jack when removed from the housing.

10 . Use a breaker bar to loosen the differential carrier-to-housing mounting bolts. Remove all bolts except top two. These two bolts will prevent the carrier assembly from falling.

NOTE: Removal holes are provided in the areas shown in the illustration. See Figure 1.

11 . Separate differential carrier from the housing. Be certain carrier is balanced properly on jack, and remove top two carrier-to-housing mounting bolts. Remove differential carrier assembly from the axle housing.

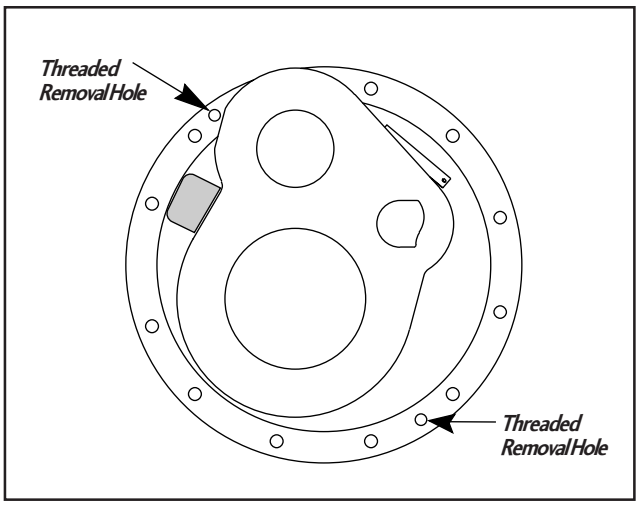


Figure 1

12 . Remove carrier assembly from under the vehicle.

13 . Mount carrier assembly in a suitable rebuild stand. **(Refer to Recommended Service Tools, Pgs. 35-36).**

Differential Carrier Removal Complete

REAR REAR CARRIER

NOTE: Steam clean axle assembly.

1 . Block wheels.

2 . Remove axle housing drain plug and drain lubricant.

3 . Disconnect drive shaft at rear U-joint.

NOTE: If end yoke and/or seal is to be replaced, loosen flanged hex nut at this time.

4 . Remove axle shaft flange nuts.

5 . Hold a large brass drift or a brass hammer against the center of the axle shaft flange. Strike the drift with sharp blows from a large hammer or sledge until the axle shaft separates from the hub.

6 . Remove axle shafts.

REMOVAL OF DIFFERENTIAL CARRIER FROM AXLE HOUSING

7. Support the differential carrier assembly on a roller jack. Secure as necessary to prevent it from falling off the jack when removed from the housing.

8. Use a breaker bar to loosen the differential carrier-to-housing mounting bolts. Remove all bolts except top two. These two bolts will prevent the carrier assembly from falling.

⚠ CAUTION: Do not strike the flange directly with a steel hammer or sledge. This may crack and splinter material, possibly causing serious or fatal injury. Do not pry or chisel axle flange away from hub as damage to sealing surfaces could occur.

NOTE: Removal holes are provided in the areas shown in the illustration See Figure 1 & 2.

9. Install two 1/2"-13 bolts into threaded holes provided in carrier housing flange. **See Figure 2.** Turn puller bolts in to break carrier away from housing. Be certain carrier is balanced properly on the jack, and remove top two carrrier-to-housing mounting bolts. Remove differential carrier assembly from the axle housing.

10. Remove carrier assembly from under the vehicle.

11. Mount carrier assembly in a suitable rebuild stand. **(Refer to Recommended Service Tools, Pgs. 35-36)**

Differential Carrier Removal Complete

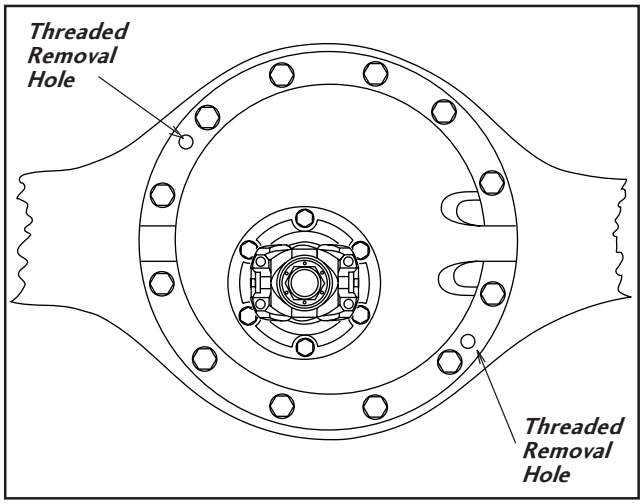


Figure 2

REMOVAL OF DIFFERENTIAL FROM CARRIER

NOTE: The following service procedures apply to both the forward rear and rear rear axles, unless otherwise noted.

1. Remove adjusting ring locks from bearing caps.

2. Match mark one differential bearing cap and leg of carrrier with center punch or chisel for use during reassembly. **See Figure 3.**

3. Loosen four bearing cap retaining bolts.

4. Loosen adjusting ring, relieving bearing preload.

5. Remove four bearing cap retainer washers and bolts.

6. Remove bearing caps.

7. Remove adjusting rings and bearing cups.

NOTE: The ring gear side of the subassembly must be tipped up for the ring gear to clear pinion roller bearing retainer.

8. Carefully lift the ring gear and differential subassembly out of the carrier.

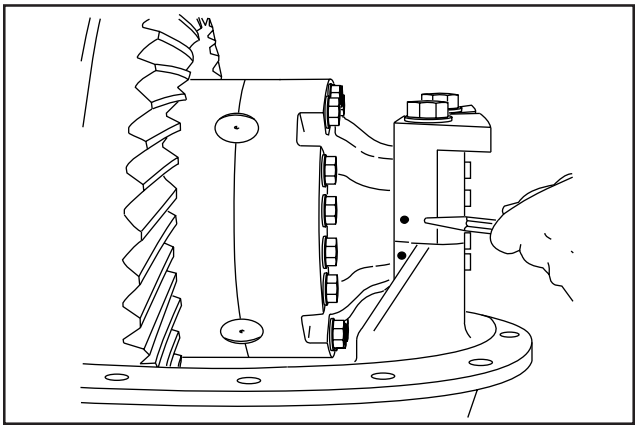


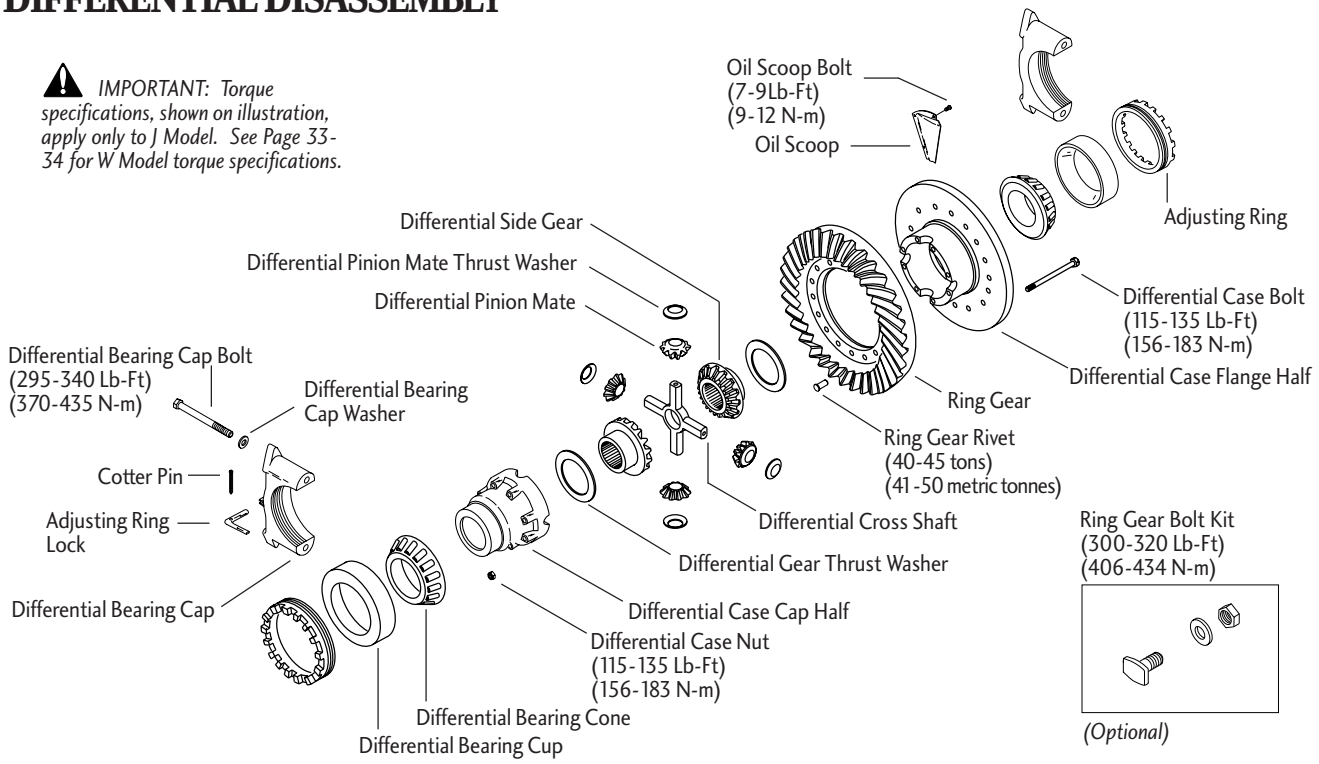
Figure 3

⚠ CAUTION: Use care not to damage the ring gear and pinion. If either ring gear or pinion show signs of damage, they must be replaced as a matched set.

Removal of Differential Complete

DIFFERENTIAL DISASSEMBLY

⚠ *IMPORTANT: Torque specifications, shown on illustration, apply only to J Model. See Page 33-34 for W Model torque specifications.*



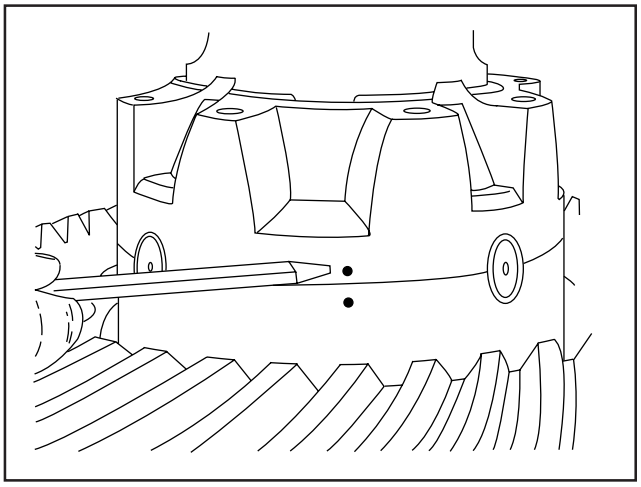


Figure 4

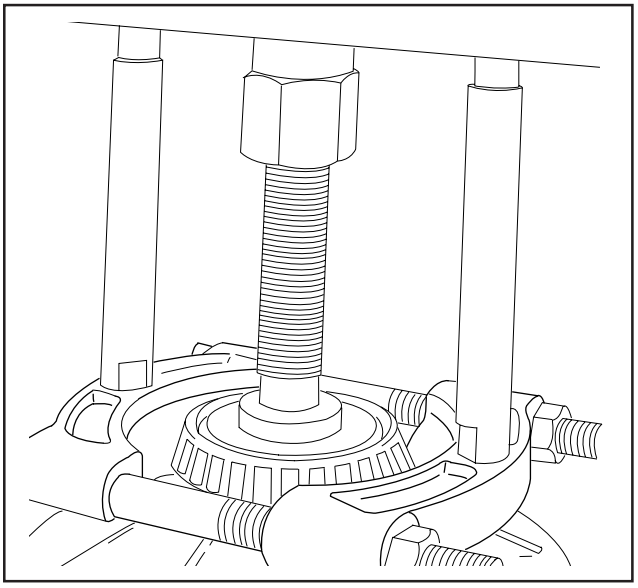


Figure 5

1 . Match mark differential case halves with punch or chisel for correct alignment during reassembly. **See Figure 4.**

2 . Remove differential case bolts and lift off the differential case half.

3 . Remove thrust washer and differential side gear.

4 . Lift out cross shaft, pinion mates, and thrust washer.

5 . Remove second differential side gear and thrust washer.

6 . If differential side bearings are to be replaced, remove old bearings using suitable puller. **See Figure 5.**

NOTE: Inspect all parts, including the machined surfaces of the case itself.

IMPORTANT: If any gears are to be replaced, they must be replaced in sets. Inspect thrust washers for scoring and excessive wear. Replace all worn or damaged parts.

7. When it is necessary to remove ring gear from differential case, carefully center punch each rivet head. Use a 9/16" drill bit on the J model carrier rivets and a 11/16" drill bit for the W model carrier rivets. Drill through the rivet heads to a depth as shown through rivet heads. **See Figure 6.**

8. Next, use a round type punch to drive out the remaining portion of the rivet.

⚠ CAUTION: Always use a soft hammer or H.D. plastic head hammer to strike punch.

NOTE: Do not use a chisel to remove rivet heads, damage to differential case may result. See Figure 7.

Differential Disassembly Complete

CORRECT PROCEDURE

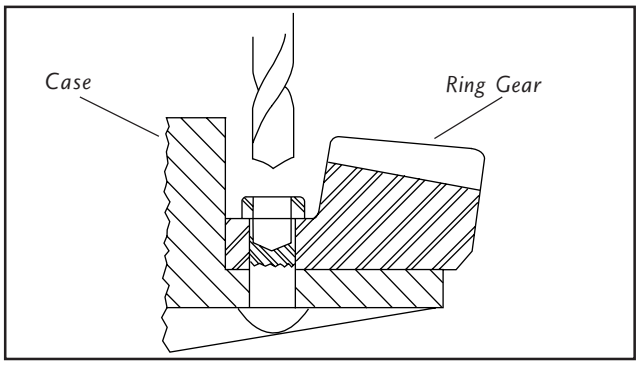


Figure 6

INCORRECT PROCEDURE

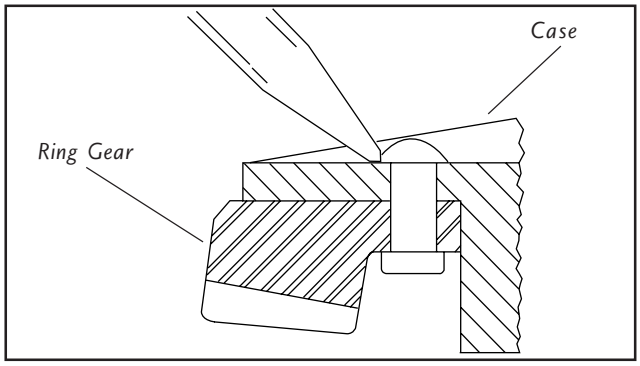
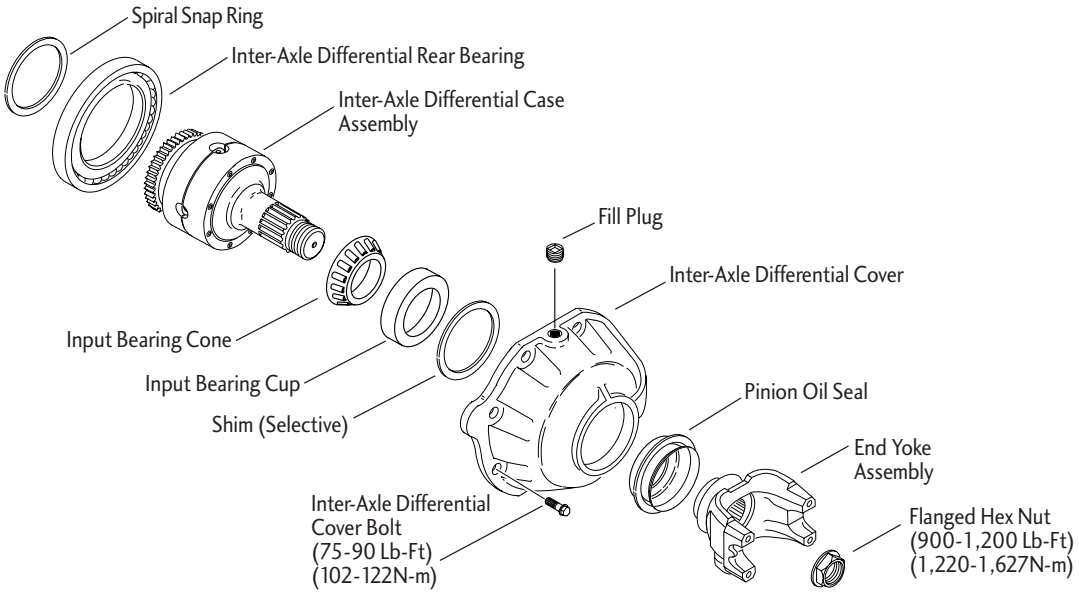


Figure 7

INTER-AXLE DIFFERENTIAL DISASSEMBLY



1 . Remove the inter-axle shift cylinder assembly, compress spring and remove retainer clip. Remove spring.

2 . Screw shift fork shaft out and remove from differential carrier.

3 . Remove inter-axle differential cover bolts

NOTE: One bolt is larger than the others and must be replaced in the same postion.

4. Lift inter-axle differential assembly from power divider case. Use of an overhead crane or hoist is recommended.

5. Remove input flanged hex nut.

NOTE: Use of torque multiplier is recommended as torque specification on the input nut is 900-1,200 Lb-Ft (1,220-1,627 N-m).

6 . Remove input yoke using suitable puller. **See Figure 8.**

7. Lift off inter-axle differential cover housing.

8 . Remove bearing cup and shims from inter-axle differential housing. Retain shims for possible use during reassembly

9 . To remove spiral snap ring, use a small bladed screw-driver. Insert tip into slot of snap ring and lift away from case. Apply pressure under snap ring and lift away from case. Apply pressure under snap ring and rotate around case until snap ring is free.

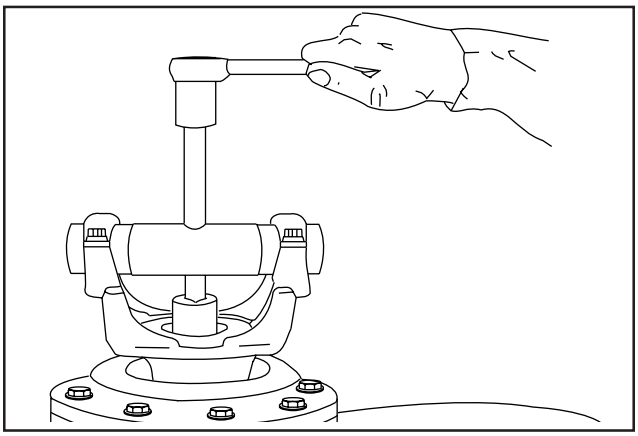


Figure 8

10 . Remove ball bearing from inter-axle differential case using a suitable puller.

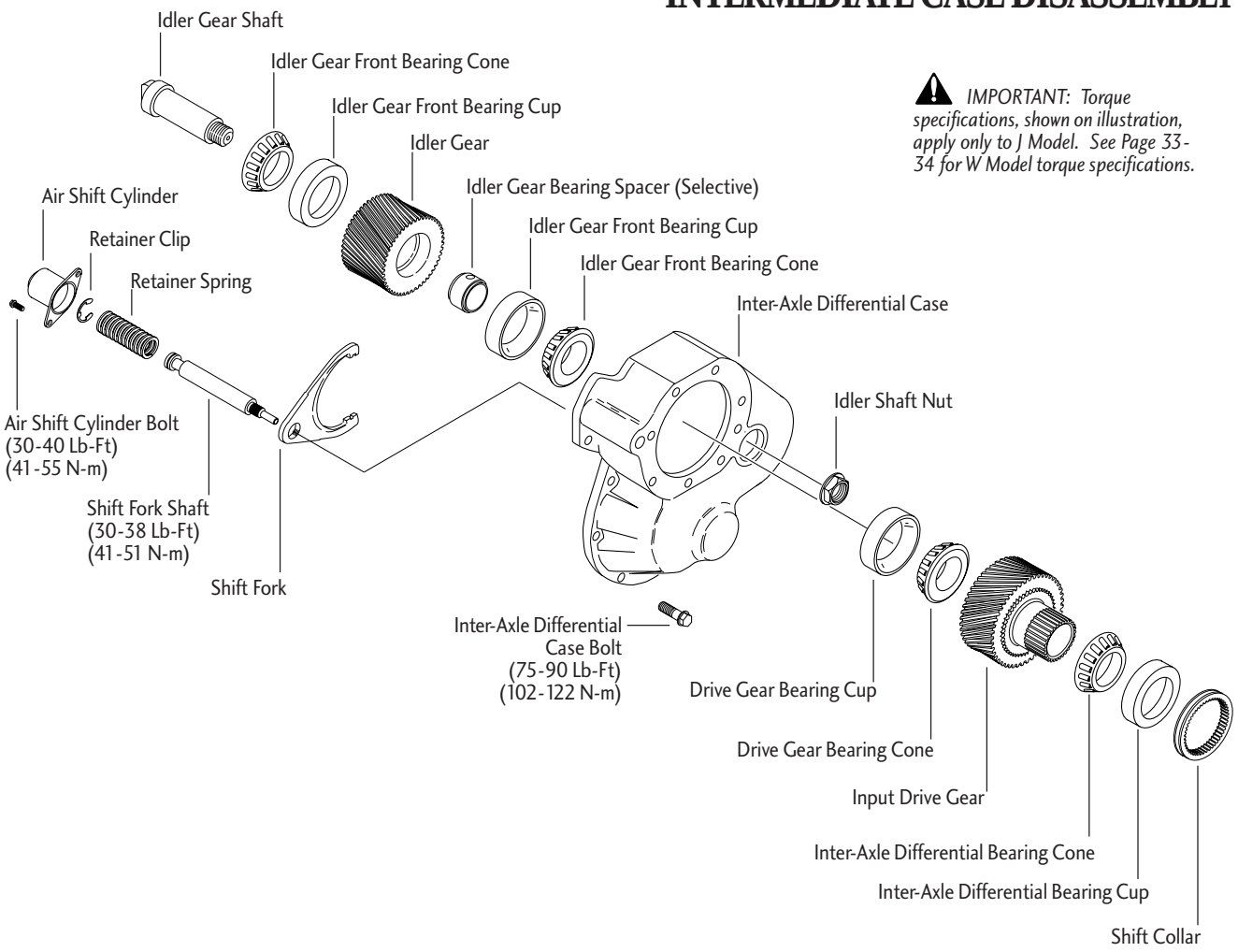
11 . Match mark differential case halves to assure correct alignment upon reassembly. Remove differential case bolts and separate case halves.

12 . Remove pinion mates, front and rear side gears, cross shaft, and thrust washers.

13 . If tapered roller bearing is to be replaced, remove bearing using a suitable puller. **See Figure 9.**

Inter-axle Differential Disassembly Complete

INTERMEDIATE CASE DISASSEMBLY



IMPORTANT: Torque specifications, shown on illustration, apply only to J Model. See Page 33-34 for W Model torque specifications.

1. Remove intermediate case to carrier housing mounting bolts. Lift intermediate case from differential carrier housing using a hoist or overhead crane. If necessary, use soft hammer to break seal between case and carrier.

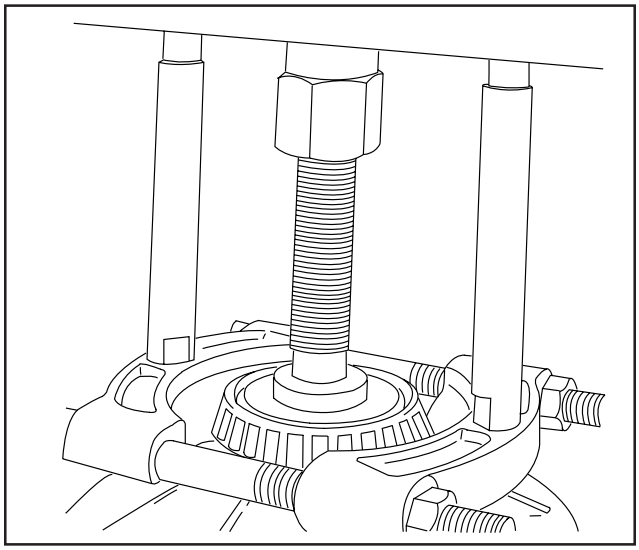
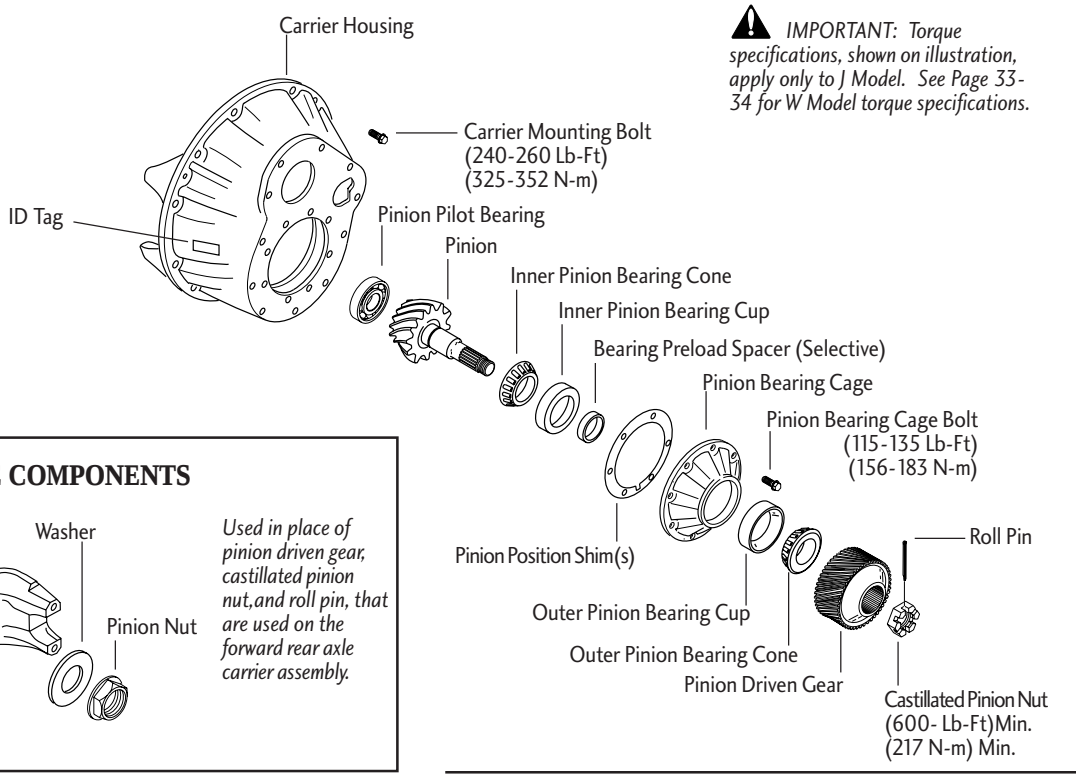


Figure 9

2. Lift clutch shift collar and shift fork from case. Inspect shift fork for wear and misalignment.
3. Remove input gear assembly from intermediate case.
4. Remove bearing from input gear using a suitable puller. **See Figure 9.**
5. Turn gear over and remove opposite bearing.
6. Place intermediate case in soft jawed vise clamping on the flats of the idler shaft. Remove idler shaft nut using a torque multiplier wrench.
7. Remove intermediate case from vise. Tap idler shaft with a soft hammer to free case and remove idler shaft.
8. Slide idler gear to large opening and remove idler gear, bearings and bearing spacer for possible use during reassembly.

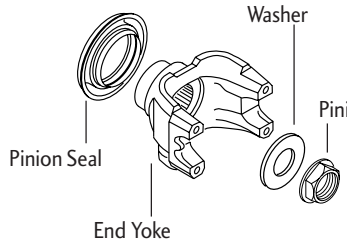
Intermediate Case Disassembly Complete

PINION DISASSEMBLY



IMPORTANT: Torque specifications, shown on illustration, apply only to J Model. See Page 33-34 for W Model torque specifications.

REAR REAR AXLE COMPONENTS



Used in place of pinion driven gear, castillated pinion nut,and roll pin, that are used on the forward rear axle carrier assembly.

1 . Remove pinion bearing cage mounting bolts.

2 . Remove pinion bearing cage and cage assembly from carrier housing. If difficulty is encountered in removing pinion assembly from carrier, place a brass drift on inner end of pinion and tap lightly.

NOTE: Retain shims for possible use during reassembly.

3 . Mount pinion assembly in a soft jawed vise or fixture, holding yoke or pinion stationary. Remove roll pin, nut, and washer.

4 . Remove the end yoke or drive gear using a suitable press.

5 . Remove pinion from cage assembly.

6 . Located between pinion bearings is a selective spacer, used for pinion bearing preload. Retain this spacer for possible use in reassembly.

7. Lift out the outer pinion bearing cone.

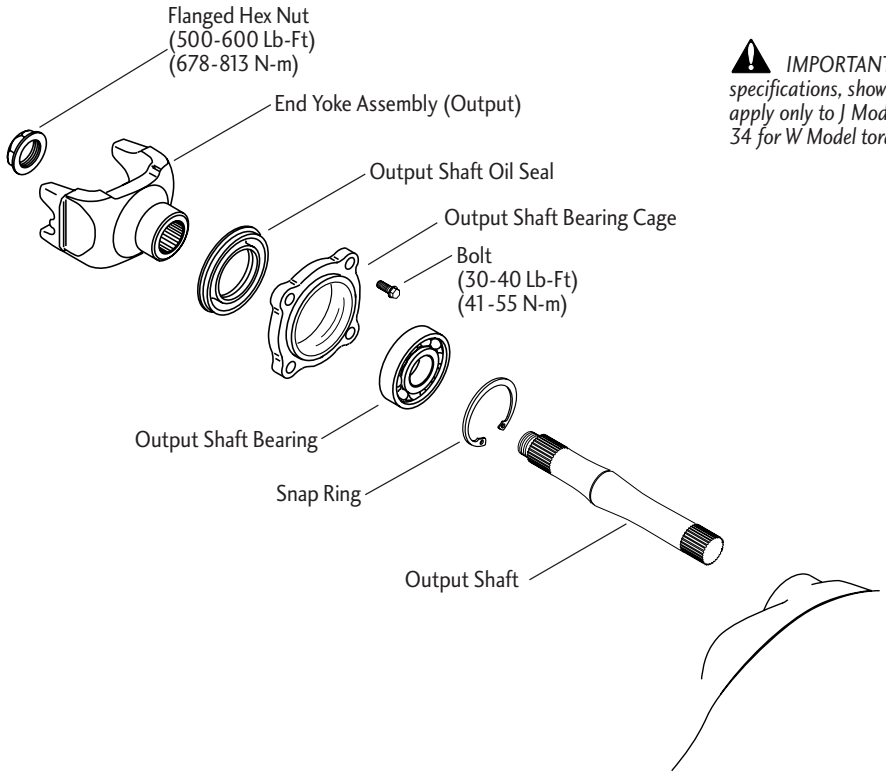
8 . Remove inner pinion bearing cup, using a suitable adapter and press or puller.

9 . Remove roller bearing from end of pinion.

10 . Remove inner bearing cone from pinion.

Pinion Disassembly Complete

OUTPUT SHAFT DISASSEMBLY



⚠ *IMPORTANT: Torque specifications, shown on illustration, apply only to J Model. See Page 33-34 for W Model torque specifications.*

1 . Remove rear drive shaft.

2 . Remove output shaft bearing cage assembly from forward rear axle housing.

3 . Mount output shaft in vise by clamping yoke in jaws of vise.

4 . Remove nut and yoke.

5 . Use snap ring tool to remove snap ring from bearing retainer.

6 . Remove bearing and retainer from shaft.

7. Using a suitable sleeve to support bearing inner race, press bearing from shaft.

8 . Using suitable sleeve, press seal from retainer.

9 . Clean and inspect all components. Replace all worn or damaged components with genuine Spicer replacement parts.

Output Shaft Disassembly Complete

CLEANING AND INSPECTION

CLEANING

1. Parts should be cleaned with emulsion cleaners or petroleum base cleaning solvent.

NOTE: Alkaline type solutions may cause damage to machined surfaces and should be avoided.

2. Make sure interior of axle housing is clean prior to reassembly.

3. Clean all gasket surfaces of old material.

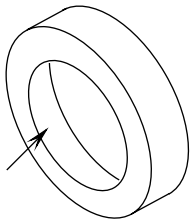
DRYING

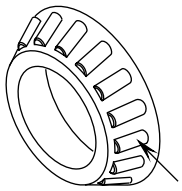
Use soft, clean, lintless towels or rags to dry components after cleaning. Bearings should *not* be dried by spinning with compressed air. This can damage mating surfaces due to the lack of lubrication.

After drying, parts should be coated with a light coat of lubricant or rust inhibitor to prevent damage from corrosion. If parts are to be stored for a prolonged period, they should be wrapped in wax paper.

INSPECTION

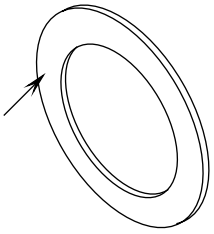
Prior to reassembly, inspect parts for signs of excessive wear or damage. Replacement of these parts can prevent premature failure and costly downtime.

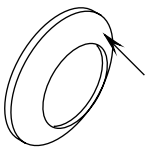




BEARINGS

Bearing surfaces should be inspected for pitting, excessive wear, or overheating.

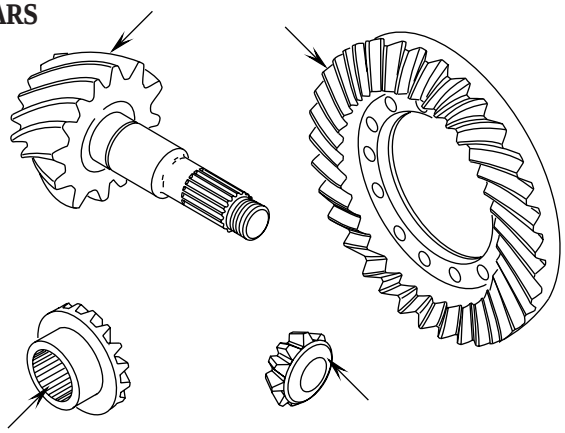




THRUST WASHERS

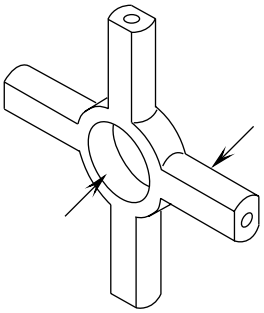
Inspect thrust washers for scoring and cracking.

GEARS



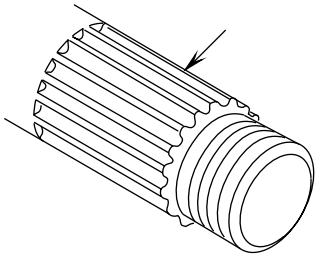
Inspect gears for excessive wear or damage. Replace gears that are pitted, scored, broken, or worn.

SHAFTS



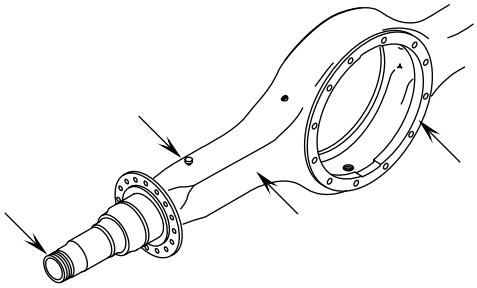
Inspect shafts for nicks or scoring.

SPLINES



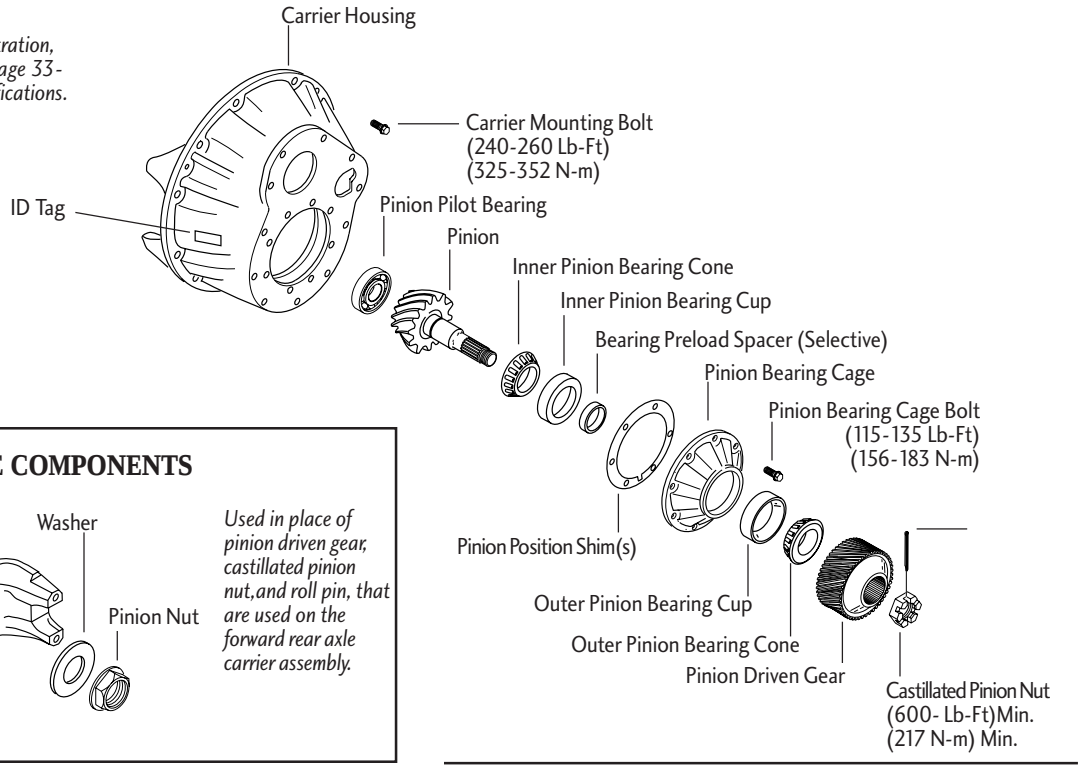
Inspect all splines for excessive wear, distortion from twisting, and cracking.

HOUSINGS

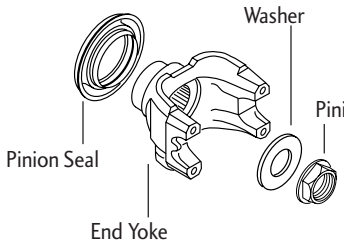


Inspect housing for stripped threads and bending fatigue.

⚠ *IMPORTANT: Torque specifications, shown on illustration, apply only to J Model. See Page 33-34 for W Model torque specifications.*



REAR REAR AXLE COMPONENTS



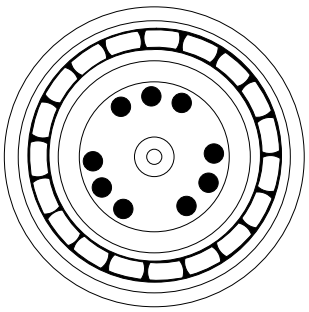
Used in place of pinion driven gear, castillated pinion nut,and roll pin, that are used on the forward rear axle carrier assembly.

1 . Press inner pinion bearing cone onto the pinion.

2 . Press roller bearing onto nose of pinion.

NOTE: Bearing must be installed with radius in bearing bore toward pinion.

3 . Stake roller bearing in nine places **(See illustration below)**, using a center punch or equivalent tool. This operation will move gear shaft material outward into bearing chamfer.



NOTE: Make sure all cage bores are free of nicks, dirt, or any other contaminants.

4 . Install inner pinion bearing cup into pinion cage.

5 . Install outer pinion bearing cup into pinion cage.

6 . Use a feeler guage or shim stock .0015 in. (.0381 mm) to ensure bearing cups are completely seated in bearing bores **See Figure 10.** This is necessary for proper pinion position.

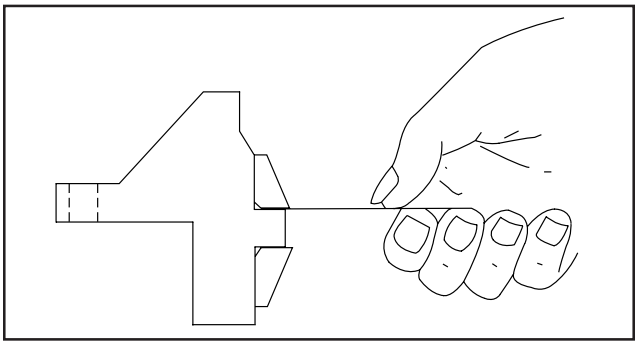


Figure 10

7. Press inner pinion bearing onto pinion stem.

8 . Place selective preload spacer that was removed during disassembly onto pinion.

9 . Place pinion cage onto pinion inner bearing.

10 . Install outer pinion bearing cone onto pinion.

11 . Inspect rear rear carrier end yoke seal surface for grooves caused by lip of seal. If grooves can be detected with fingernail, it should be replaced.

12 . Install gear onto pinion of forward rear carrier. Place assembly in a hydraulic press and seat gear on spline. Torque castillated nut to 600 Lb-Ft Min. If hole in pinion

does not align with slots in nut, tighten nut until they are aligned. Do not install roll pin at this time.

On rear carriers, install end yoke onto pinion using yoke installer service tool, **(See Figure 11 and Recommended Service Tools Pgs. 35-36),** without seal to allow proper setting of bearing preload. Tighten pinion nut to 900-1200 Lb-Ft (1,220-1,627 N-m).

NOTE: Pinion cage should be rotated while tightening pinion nut to seat and align the pinion bearings.

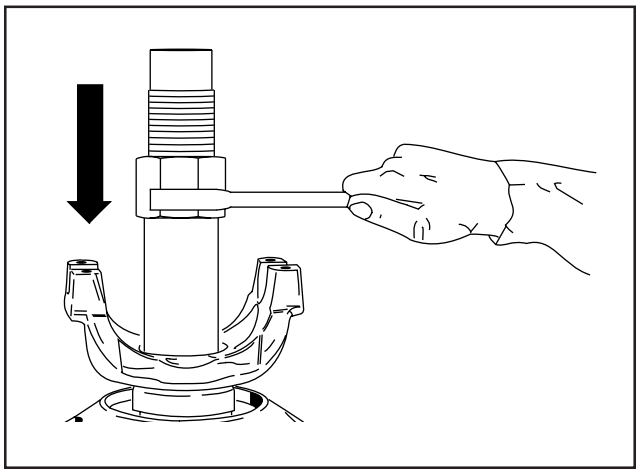


Figure 11

12 . Measure torque to rotate with the torque wrench, assemble pinion cage into the carrier housing and install two mounting bolts to anchor the unit. Rotate pinion with the torque wrench. **See Figure 12.** Torque measurement will be taken during fourth revolution and must be between 10-40 Lb-in (1.1-4.5 N-m) without pinion seal.

NOTE: When torque to rotate reading does not fall within allowable limits, bearing preload can be increased by using a thinner spacer or decreased by using a thicker spacer. A .001 in. (.025 mm) change in preload spacer thickness, changes scale reading by approximately 10 lbs, .001 in. change in preload spacer will change torque to rotate by approximately 30 Lb- in. This is only a guide, individual carriers may vary slightly.

NOTE: Closer adjustment can be made by sanding next thicker spacer to desired thickness using emery cloth on a flat surface. Surfaces must be parallel to each other and square to bore diameter.

⚠ CAUTION: Wash spacer thoroughly of emery cuttings before installing on pinion.

14 . After proper preload is achieved, install new roll pin into forward carrier pinion. If roll pin cannot be installed, tighten pinion nut until roll pin can be installed. Pinion and cage assembly are now ready to be installed into the carrier housing.

15 . After proper preload is achieved on rear carriers, remove end yoke, and install new seal.

16 . Clean and dry threads on pinion.

17. Install pinion oil seal. **(See Recommended Service Tools, Pgs. 35-36)**

18 . Install end yoke using yoke installer service tool. Coat threads with Loctite #680 adhesive compound. **See Figure 11 .**

19 . Use torque multiplier and tighten flanged hex nut to 900-1,200 Lb-Ft (1,220-1,627 N-m).

Pinion Assembly Complete

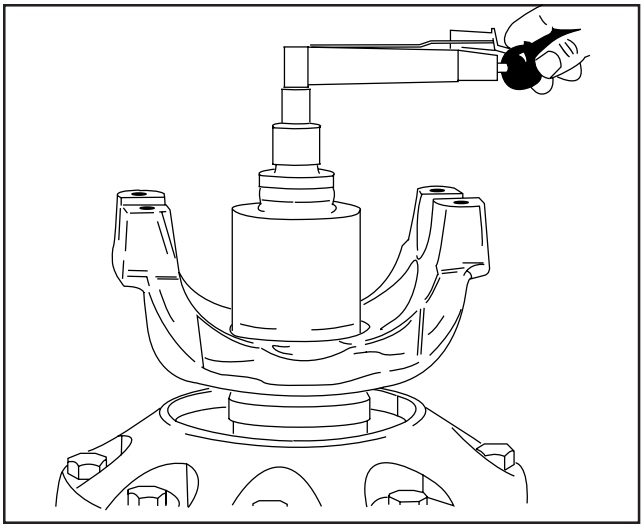


Figure 12

The pinion bearing spacers are available in the following thicknesses. Measure spacer with micrometers before assembly to ensure correct thickness.

J Model		W Model	
Inches	M M	Inches	M M
.718	18.24	.893	22.68
.719	18.26	.894	22.71

J Model		W Model	
Inches	M M	Inches	M M
.720	18.29	.895	22.73
.721	18.31	.896	22.76
.722	18.34	.897	22.78
.723	18.36	.898	22.81
.724	18.39	.899	22.84
.725	18.41	.900	22.86
.726	18.44	.901	22.89
.727	18.47	.902	22.91
.728	18.49	.903	22.94
.729	18.52	.904	22.96
.730	18.54	.905	22.99
.731	18.57	.906	23.01

J Model		W Model	
Inches	M M	Inches	M M
.732	18.60	.907	23.04
.733	18.62	.908	23.06
.734	18.64	.909	23.09
.735	18.67	.910	23.11
.736	18.69	.911	23.14
.737	18.72	.916	23.27
.738	18.75		
.739	18.77		
.740	18.80		
.741	18.82		
.742	18.85		
.745	18.92		

PINION POSITION

Ring gears and pinions are supplied in matched sets only. Matching numbers on both the pinion and ring gear are etched for verification. If a new gear set is being used, verify the numbers of each pinion and ring gear before proceeding with assembly. **(See Gear Set Identification, Pg. 2)**

Pinion position is based on the nominal mounting distance measured from the centerline of the ring gear to the nose of the pinion. This dimension is controlled by selectively shimming between the pinion cage assembly and the carrier housing. The nominal dimension is 3.976 in. (100.990 mm).

NOTE: Be sure mounting surfaces and shims are free of burrs and dirt prior to assembly as they will affect pinion position.

1 . To establish the correct nominal dimension by using a pinion setting gauge, install pinion and cage assembly into the carrier housing without shims. Tighten pinion cage bolts to correct torque specifications. **(See Torque Specification Chart, Pgs. 33-34)** Failure to tighten properly may result in incorrect gear adjustment.

2 . Attach the step plate clamp assembly to the carrier mounting flange. Locate step plate clamp screw over center of pinion. Install step plate under clamp screw and tighten to hold step plate securely in position.

NOTE: Be sure lugs on bottom of step plate straddle the bearing staking indentions on end of pinion, or false reading may occur. Also, make sure differential side bearing bores are clean and free of nicks.

3 . Remove any burrs and wipe clean differential bearing bore I.D.'s. Turn micrometer 90° to step plate. Install assembled pinion setting gauge into bearing bores of carrier housing until fully seated. Adjust micrometer so it is directly over end of step plate. Run the micrometer thimble down to measure the distance between the center of the ring gear and the step plate. Make a note of this dimension. **See Figure 13.**

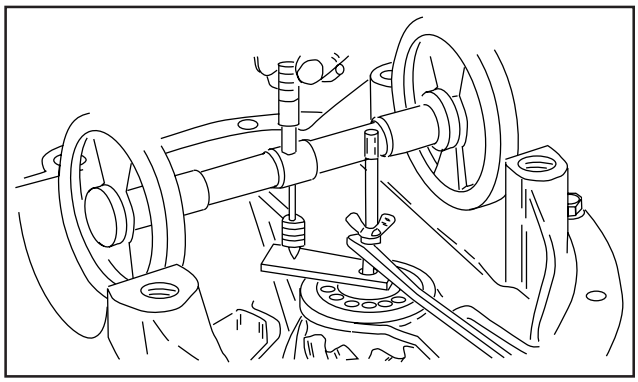


Figure 13

NOTE: Because the step plate must be taken into consideration, the thickness of the step plate (.400 in. (10.16 mm)) needs to be added to the measured value for the correct micrometer distance.

4 . On the machined end of each pinion either a plus (+), minus (-), or a zero (0) will be etched. **(See Gear Set Identification, Pg. 2)** This number represents the amount

PINION POSITION

in thousandths of an inch (.001) to be added or subtracted from the nominal dimension for the best running position for that particular gear set.

EXAMPLE:

If pinion is etched +3, the required mounting distance is more than nominal by .003 in. (.076 mm). This means the pinion would require .003 in. (.076 mm) thicker shim between pinion bearing cage assembly and carrier housing that a pinion etched with "0". If the pinion is marked -3, the shim required between pinion gearing cage assembly and carrier housing would be .003 in (.076 mm) thinner than if pinion was etched "0".

5. Pinion shims are available in the following thicknesses.

Inches	MM
.005	.127
.010	.254
.030	.762

6. Position shims on carrier housing so oil return holes align properly. Use a minimum of three shims in a pack. If the pack is made of different shim thicknesses, install the thinnest shims on both sides of the pack for maximum sealing.

NOTE: Be sure mounting surfaces and shims are free of dirt and nicks prior to assembly or leaks will occur and pinion position can be affected.

7. Install pinion and pinion cage assembly into carrier.

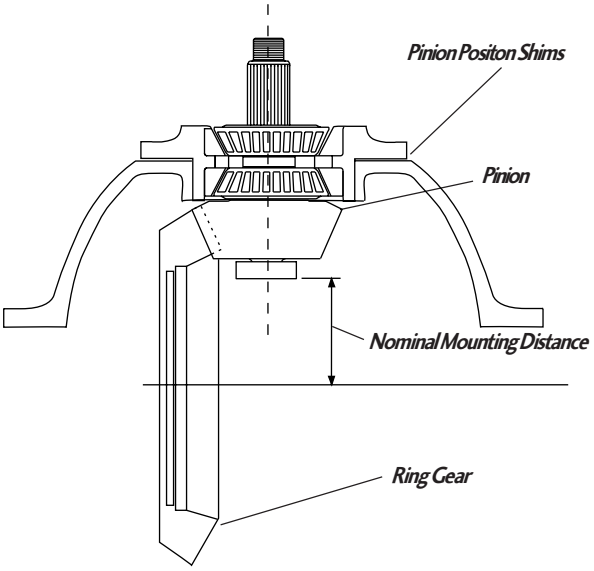
NOTE: Studs can be used to assist in alignment.

8. Tighten pinion cage to carrier bolts. **(See Torque Specifications Chart, Pgs. 33-34)**

9. An alternative to using the pinion setting gauges is to follow the procedure described in the following section.

Pinion Position Complete

When a new gear set is being installed, use a micrometer to measure the thickness of the old pinion position shims. Measure each shim separately and add together to get the total thickness of the original build-up.



PINION SETTING

NOTE: If old shims are bent or mutilated they should be replaced.

If a new gear set is being used, notice the (+), (–) or "0" etching on both the old and the new pinions, and adjust the thickness of the shims to compensate for the difference of these two figures **(as shown in table on next page)**.

For example, if the old pinion is etched +2, and the new pinion is –2, subtract .004 in. from the thickness of the original shims used to position the pinion.

If either or both the pinions are etched beyond the values on this chart, follow the same procedure to establish correct pinion position.

For example if the old pinion is etched –12 and the new pinion is etched +9, add .021 in. to the thickness of the original shims.

After determining the new total build up of pinion position shims, round the figure off to the nearest multiple of .005 inch.

Use the Pinion Setting Chart on the next page as a guideline to set the pinion.

PINION SETTING CHART(OLD TO NEW PINION)

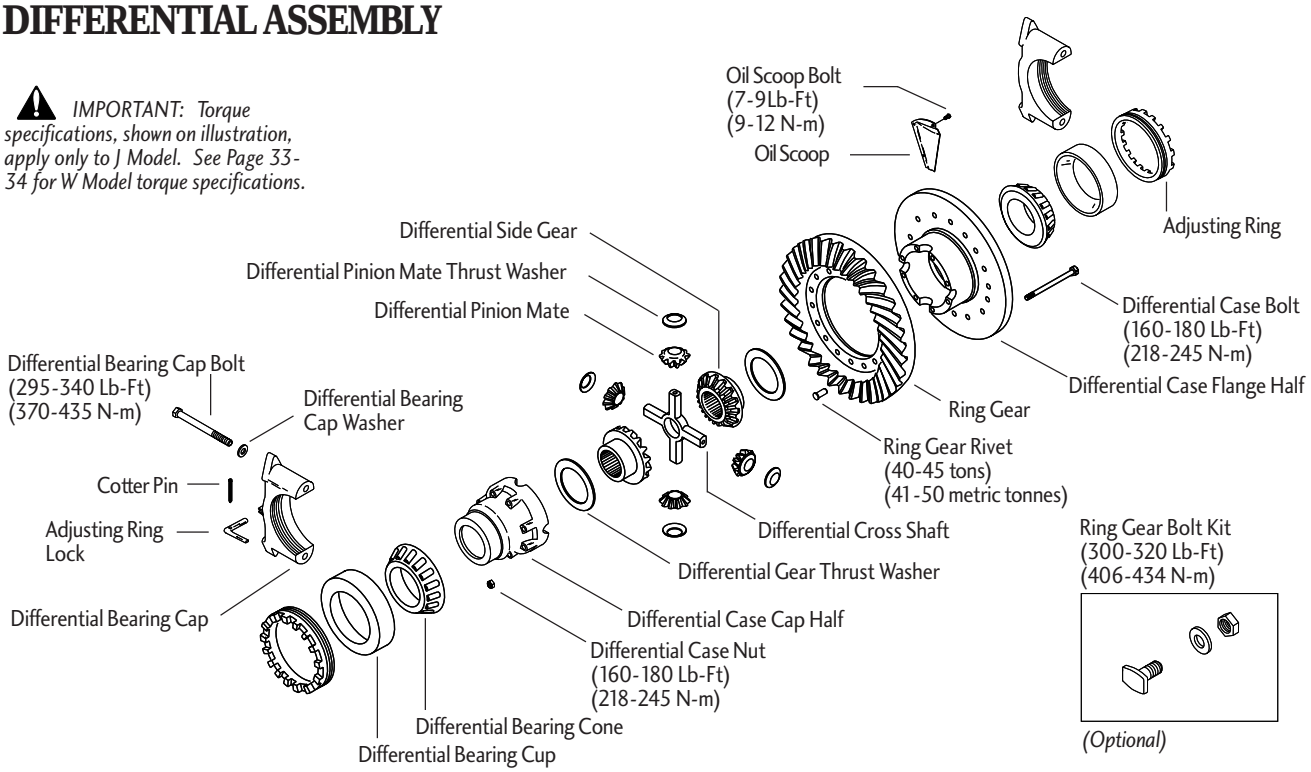
0.000 TOP(INCHES)
.000 BOTTOM(MM)

NEW PINION MARKING

OLD PINION MARKING	-10 M-25	-9 M-23	-8 M-20	-7 M-18	-6 M-15	-5 M-13	-4 M-10	-3 M-08	-2 M-05	-1 M-03	0	+1 M+03	+2 M+05	+3 M+08	+4 M+10	+5 M+13	+6 M+15	+7 M+18	+8 M+20	+9 M+23	+10 M+25
+10 M+25	-0.020 .508	-0.019 .483	-0.018 .457	-0.017 .432	-0.016 .406	-0.015 .381	-0.014 .356	-0.013 .330	-0.012 .305	-0.011 .279	-0.010 .254	-0.009 .227	-0.008 .203	-0.007 .178	-0.006 .152	-0.005 .127	-0.004 .102	-0.003 .076	-0.002 .051	-0.001 .025	0
+9 M+23	-0.019 .483	-0.018 .457	-0.017 .432	-0.016 .406	-0.015 .381	-0.014 .356	-0.013 .330	-0.012 .305	-0.011 .279	-0.010 .254	-0.009 .227	-0.008 .203	-0.007 .178	-0.006 .152	-0.005 .127	-0.004 .102	-0.003 .076	-0.002 .051	-0.001 .025	0	+0.001 .025
+8 M+20	-0.018 .457	-0.017 .432	-0.016 .406	-0.015 .381	-0.014 .356	-0.013 .330	-0.012 .305	-0.011 .279	-0.010 .254	-0.009 .227	-0.008 .203	-0.007 .178	-0.006 .152	-0.005 .127	-0.004 .102	-0.003 .076	-0.002 .051	-0.001 .025	0	+0.001 .025	+0.002 .051
+7 M+18	-0.017 .432	-0.016 .406	-0.015 .381	-0.014 .356	-0.013 .330	-0.012 .305	-0.011 .279	-0.010 .254	-0.009 .227	-0.008 .203	-0.007 .178	-0.006 .152	-0.005 .127	-0.004 .102	-0.003 .076	-0.002 .051	-0.001 .025	0	+0.001 .025	+0.002 .051	+0.003 .076
+6 M+15	-0.016 .406	-0.015 .381	-0.014 .356	-0.013 .330	-0.012 .305	-0.011 .279	-0.010 .254	-0.009 .227	-0.008 .203	-0.007 .178	-0.006 .152	-0.005 .127	-0.004 .102	-0.003 .076	-0.002 .051	-0.001 .025	0	+0.001 .025	+0.002 .051	+0.003 .076	+0.004 .102
+5 M+13	-0.015 .381	-0.014 .356	-0.013 .330	-0.012 .305	-0.011 .279	-0.010 .254	-0.009 .227	-0.008 .203	-0.007 .178	-0.006 .152	-0.005 .127	-0.004 .102	-0.003 .076	-0.002 .051	-0.001 .025	0	+0.001 .025	+0.002 .051	+0.003 .076	+0.004 .102	+0.005 .127
+4 M+10	-0.014 .356	-0.013 .330	-0.012 .305	-0.011 .279	-0.010 .254	-0.009 .227	-0.008 .203	-0.007 .178	-0.006 .152	-0.005 .127	-0.004 .102	-0.003 .076	-0.002 .051	-0.001 .025	0	+0.001 .025	+0.002 .051	+0.003 .076	+0.004 .102	+0.005 .127	+0.006 .152
+3 M+08	-0.013 .330	-0.012 .305	-0.011 .279	-0.010 .254	-0.009 .227	-0.008 .203	-0.007 .178	-0.006 .152	-0.005 .127	-0.004 .102	-0.003 .076	-0.002 .051	-0.001 .025	0	+0.001 .025	+0.002 .051	+0.003 .076	+0.004 .102	+0.005 .127	+0.006 .152	+0.007 .178
+2 M+05	-0.012 .305	-0.011 .279	-0.010 .254	-0.009 .227	-0.008 .203	-0.007 .178	-0.006 .152	-0.005 .127	-0.004 .102	-0.003 .076	-0.002 .051	-0.001 .025	0	+0.001 .025	+0.002 .051	+0.003 .076	+0.004 .102	+0.005 .127	+0.006 .152	+0.007 .178	+0.008 .203
+1 M+03	-0.011 .279	-0.010 .254	-0.009 .227	-0.008 .203	-0.007 .178	-0.006 .152	-0.005 .127	-0.004 .102	-0.003 .076	-0.002 .051	-0.001 .025	0	+0.001 .025	+0.002 .051	+0.003 .076	+0.004 .102	+0.005 .127	+0.006 .152	+0.007 .178	+0.008 .203	+0.009 .227
0	-0.010 .254	-0.009 .227	-0.008 .203	-0.007 .178	-0.006 .152	-0.005 .127	-0.004 .102	-0.003 .076	-0.002 .051	-0.001 .025	0	+0.001 .025	+0.002 .051	+0.003 .076	+0.004 .102	+0.005 .127	+0.006 .152	+0.007 .178	+0.008 .203	+0.009 .227	+0.010 .254
-1 M-03	-0.009 .227	-0.008 .203	-0.007 .178	-0.006 .152	-0.005 .127	-0.004 .102	-0.003 .076	-0.002 .051	-0.001 .025	0	+0.001 .025	+0.002 .051	+0.003 .076	+0.004 .102	+0.005 .127	+0.006 .152	+0.007 .178	+0.008 .203	+0.009 .227	+0.010 .254	+0.011 .279
-2 M-05	-0.008 .203	-0.007 .178	-0.006 .152	-0.005 .127	-0.004 .102	-0.003 .076	-0.002 .051	-0.001 .025	0	+0.001 .025	+0.002 .051	+0.003 .076	+0.004 .102	+0.005 .127	+0.006 .152	+0.007 .178	+0.008 .203	+0.009 .227	+0.010 .254	+0.011 .279	+0.012 .305
-3 M-08	-0.007 .178	-0.006 .152	-0.005 .127	-0.004 .102	-0.003 .076	-0.002 .051	-0.001 .025	0	+0.001 .025	+0.002 .051	+0.003 .076	+0.004 .102	+0.005 .127	+0.006 .152	+0.007 .178	+0.008 .203	+0.009 .227	+0.010 .254	+0.011 .279	+0.012 .305	+0.013 .330
-4 M-10	-0.006 .152	-0.005 .127	-0.004 .102	-0.003 .076	-0.002 .051	-0.001 .025	0	+0.001 .025	+0.002 .051	+0.003 .076	+0.004 .102	+0.005 .127	+0.006 .152	+0.007 .178	+0.008 .203	+0.009 .227	+0.010 .254	+0.011 .279	+0.012 .305	+0.013 .330	+0.014 .356
-5 M-13	-0.005 .127	-0.004 .102	-0.003 .076	-0.002 .051	-0.001 .025	0	+0.001 .025	+0.002 .051	+0.003 .076	+0.004 .102	+0.005 .127	+0.006 .152	+0.007 .178	+0.008 .203	+0.009 .227	+0.010 .254	+0.011 .279	+0.012 .305	+0.013 .330	+0.014 .356	+0.015 .381
-6 M-15	-0.004 .102	-0.003 .076	-0.002 .051	-0.001 .025	0	+0.001 .025	+0.002 .051	+0.003 .076	+0.004 .102	+0.005 .127	+0.006 .152	+0.007 .178	+0.008 .203	+0.009 .227	+0.010 .254	+0.011 .279	+0.012 .305	+0.013 .330	+0.014 .356	+0.015 .381	+0.016 .406
-7 M-18	-0.003 .076	-0.002 .051	-0.001 .025	0	+0.001 .025	+0.002 .051	+0.003 .076	+0.004 .102	+0.005 .127	+0.006 .152	+0.007 .178	+0.008 .203	+0.009 .227	+0.010 .254	+0.011 .279	+0.012 .305	+0.013 .330	+0.014 .356	+0.015 .381	+0.016 .406	+0.017 .432
-8 M-20	-0.002 .051	-0.001 .025	0	+0.001 .025	+0.002 .051	+0.003 .076	+0.004 .102	+0.005 .127	+0.006 .152	+0.007 .178	+0.008 .203	+0.009 .227	+0.010 .254	+0.011 .279	+0.012 .305	+0.013 .330	+0.014 .356	+0.015 .381	+0.016 .406	+0.017 .432	+0.018 .457
-9 M-23	-0.001 .025	0	+0.001 .025	+0.002 .051	+0.003 .076	+0.004 .102	+0.005 .127	+0.006 .152	+0.007 .178	+0.008 .203	+0.009 .227	+0.010 .254	+0.011 .279	+0.012 .305	+0.013 .330	+0.014 .356	+0.015 .381	+0.016 .406	+0.017 .432	+0.018 .457	+0.019 .483
-10 M-25	0	+0.001 .025	+0.002 .051	+0.003 .076	+0.004 .102	+0.005 .127	+0.006 .152	+0.007 .178	+0.008 .203	+0.009 .227	+0.010 .254	+0.011 .279	+0.012 .305	+0.013 .330	+0.014 .356	+0.015 .381	+0.016 .406	+0.017 .432	+0.018 .457	+0.019 .483	+0.020 .508

DIFFERENTIAL ASSEMBLY

⚠ *IMPORTANT: Torque specifications, shown on illustration, apply only to J Model. See Page 33-34 for W Model torque specifications.*



1 . If ring gear was removed from differential case, reinstall at this time. Clean mating surfaces and bolt ring gear to differential case at 3 locations, 120˚ apart to help eliminate ring gear runout. Use hydraulic press and suitable riveting fixture, as shown. Pressure requirement per rivet is 45-50 tons (41-45 metric tonnes).

The ring gear is properly installed when a .0015" (.038 mm) feeler guage cannot be inserted between the differential case flange and the ring gear backface. **See Figure 14.**

NOTE: Ring gear and pinion must be replaced as a match set only.

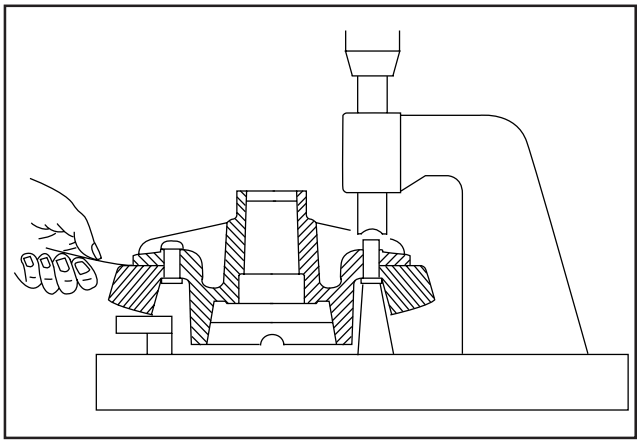


Figure 14

2 . Install bearing cones to differential case halves. Place bearing cups on cones during remainder of assembly to prevent damage to bearings.

NOTE: Use of press and proper adapter is required to eliminate possible damage to bearings.

3 . Apply a small amount of lubricant to all mating surfaces. This will keep thrust washers in place during assembly and provide initial lubrication.

4 . Place thrust washer and side gear in flange half of differential case. Dimples in thrust washers go against side gear.

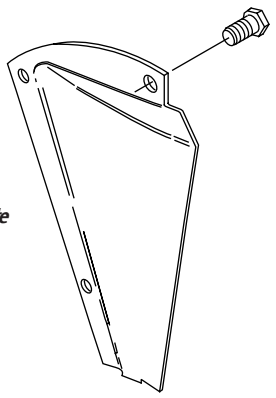
5 . Assemble differential pinions and thrust washers on cross shaft. Place assembly in flange half differential case.

6 . Place remaining side gear and thrust washers in position on differential pinions.

7. Assemble case halves, making sure that both match marks are lined up.

8 . Install differential case bolts. Tighten alternately and evenly. **(See Torque Specifications Chart, Pgs. 33-34)**

Differential Assembly Complete



Oil Pick-Up Plate

1 . Three differential cases are used with the W Model carriers, depending on the ratio. Two of the cases have two oil pick-up plates attached. Clean and coat bolts with Loctite #271 or its equivalent. Assemble and torque bolts to 7-9 Lb-Ft (9-12 N-m)

⚠ CAUTION: Differential assembly must be aligned within bearing bores before preload is applied or damage to bearings could occur.

2 . Install ring gear and differential assembly into carrier housing.

CAUTION: To avoid damage of the ring gear and pinion, care should be used when installing the ring gear differential assembly into the carrier housing.

3 . Be sure side bearing cups are seated on bearing cones. Assemble differential bearing caps, with match marks in proper location. Clean differential bearing cap bolts and washers and coat threads with Loctite #277 or its equivalent. Install bearing cap bolts and tighten enough to eliminate visible space between differential bearing cap and carrier housing. Do not torque the cap bolts at this time.

4 . Install adjusting rings. Tighten both adjusting rings until end play is eliminated and there is backlash between the ring gear and pinion. **See Figure 15.**

5 . Loosen adjusting ring on tooth side of ring gear 1 notch and tighten adjusting ring on flange side of ring gear 1 notch. Repeat process until backlash is eliminated. Tighten adjusting ring on tooth side of the ring gear 2 or 3 notches or until proper backlash and side bearing preload are established.

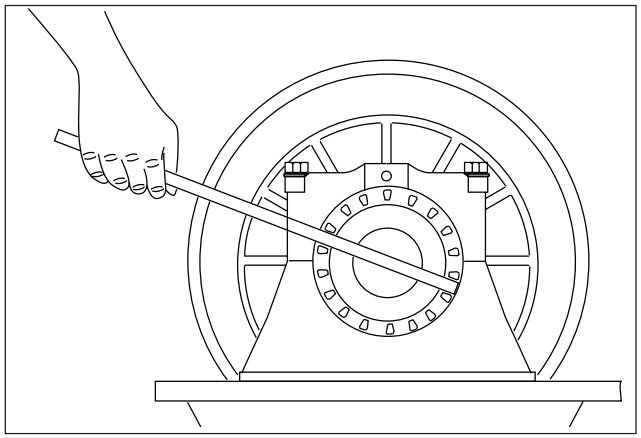


Figure 15

6 . Check ring gear and pinion backlash in four equally spaced positions around the ring gear with a dial indicator as shown. **Acceptable backlash tolerance is .006"-.012". See Figure 16.**

NOTE: If backlash tolerance varies more than .003" (.080 mm) between the four positions, remove the differential and determine the cause.

7. Once backlash is set, torque the differential bearing cap bolts to 295-340 Lb-Ft (397-460 N-m). Check backlash after torquing cap bolts.

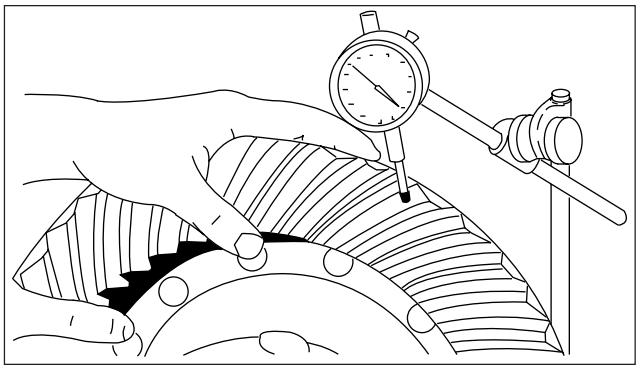
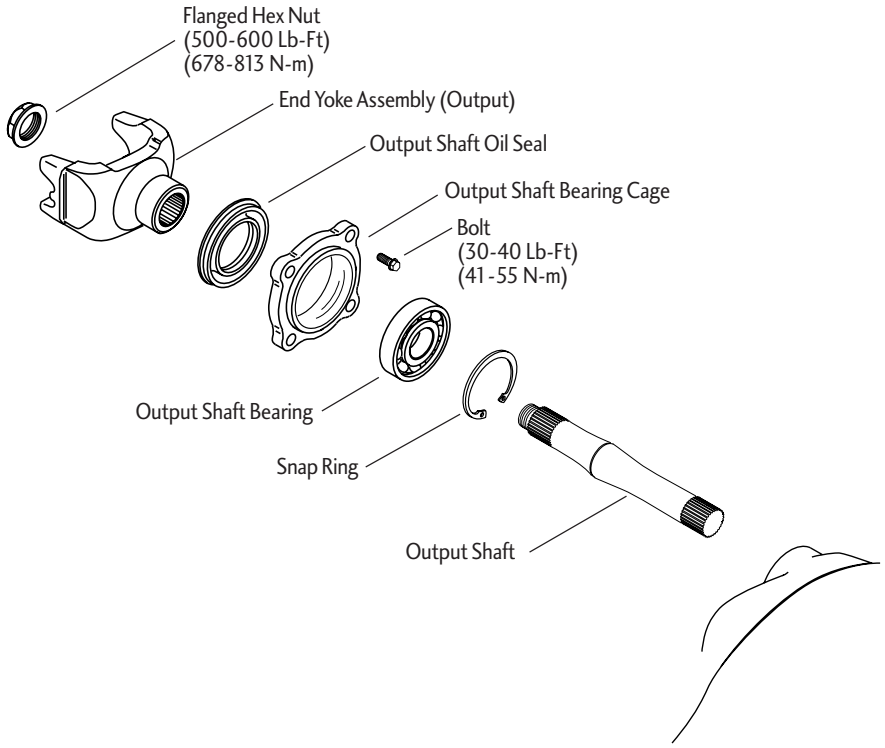


Figure 16

Differential Installation Complete

OUTPUT SHAFT ASSEMBLY



1 . Support output shaft bearing and press output shaft into bearing.

2 . Install bearing cage over bearing and secure with snap ring.

NOTE: To insure proper end play, both inner and outer bearings are in matched sets with spacers. Do not mix separate bearings.

⚠ **CAUTION: Use only enough pressure to lightly seat bearings against the thick spacer. Excessive pressure could damage the assembly.**

3 . Install new seal using seal installer tool **(See Recommended Service Tools, Pgs. 35-36).**

4 . Install end yoke using yoke installer tool **(See Recommended Service Tools, Pgs. 35-36)** and place washer onto shaft. Clean and dry threads, then coat with Loctite #680 and torque to 500-600 Lb-Ft (678-813 N-m).

5 . Clean mating surface on axle housing and output shaft bearing retainer. Apply a 1/16" bead of Loctite #518 Gasket Eliminator on housing mounting flange and around bolt holes. Install output shaft, with lube trough to bottom. **See Figure 17.** Tighten mounting bolts evenly to 30-40 Lb-Ft (41-55 N-m).

6 . Install rear drive shaft.

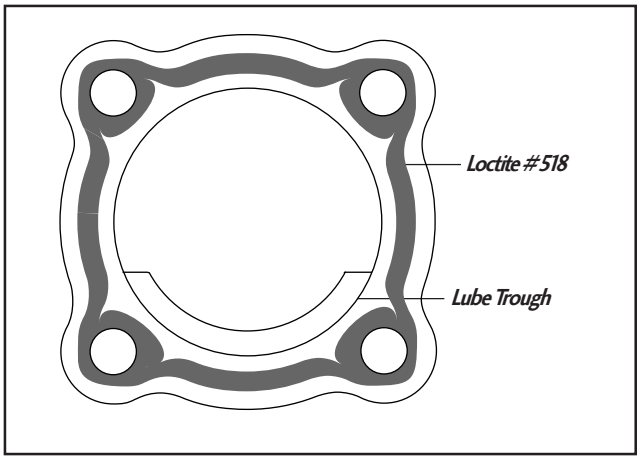
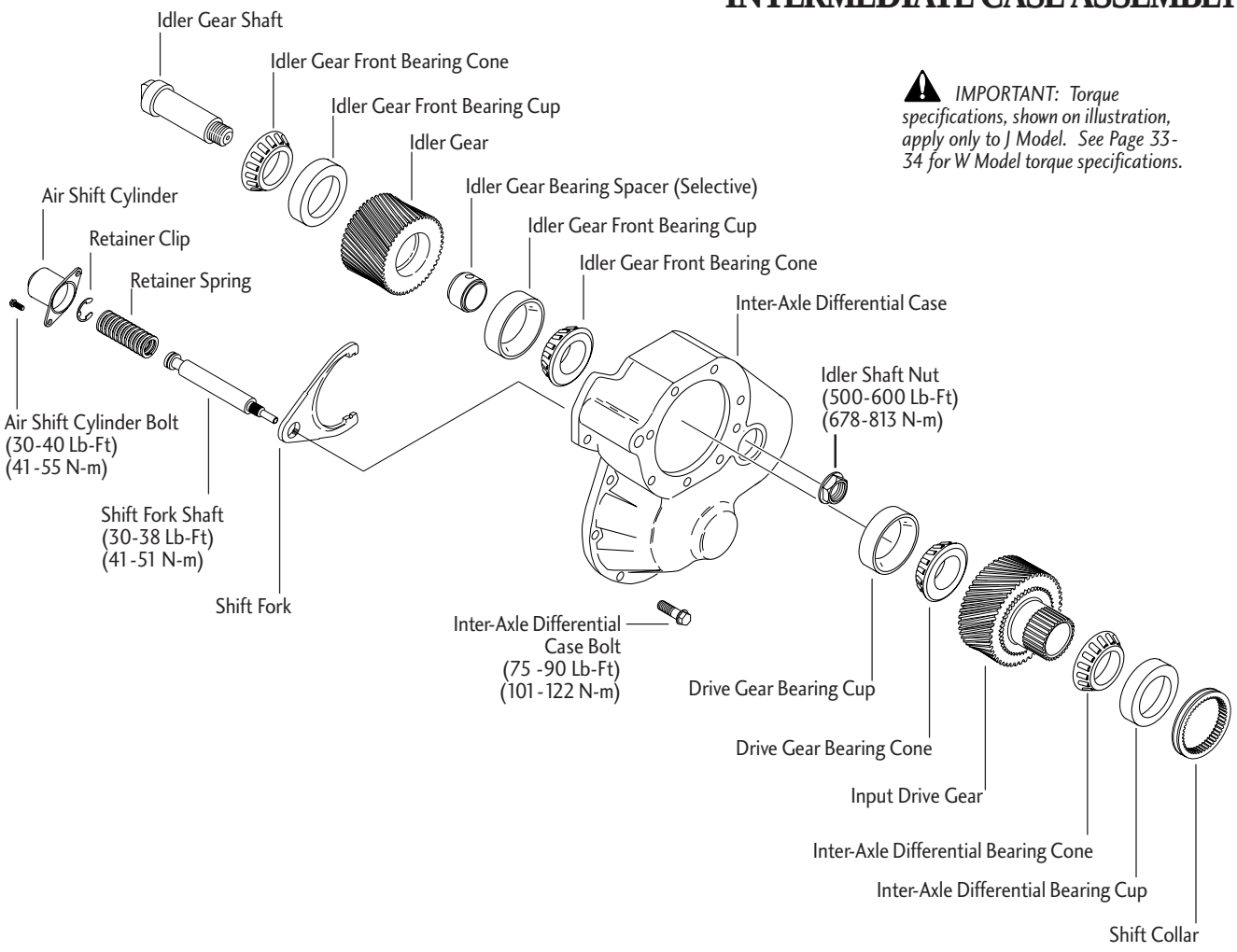


Figure 17

Output Shaft Assembly Complete

INTERMEDIATE CASE ASSEMBLY



IMPORTANT: Torque specifications, shown on illustration, apply only to J Model. See Page 33-34 for W Model torque specifications.

1. Install bearing cups into the idler gear. Be certain cups are pressed completely into or improper measurement of end play will result.
2. Install bearing spacer and bearings into idler gear. The end play is controlled by the bearing spacer.
3. Install idler gear into intermediate case. Slide gear into position.
4. Install idler shaft into idler gear and intermediate case.
5. Install input gear bearing cup into intermediate case. Use of Loctite to help retain bearing cup in case is recommended.

IMPORTANT: A special plate has been designed to aid in assembly. A print of the special plate is provided for your convenience. See Pg. 19.

The plate accomplishes two things:

A. It positions the idler shaft properly to facilitate assembly of the intermediate case to the differential carrier housing.

B. It retains the input gear bearing cup in the intermediatecase when checking end play of the inter-axle differential.

8. Turn intermediate case over. Install a new prevailing torque nut.
9. Retain intermediate case to eliminate movement. Use a torque multiplier wrench and torque idler shaft nut to 500-600 Lb-Ft (675-800 N-m).
10. The idler gear is designed to run with end play. Using a dial indicator, check end play. End play should be .001" to .006". If it is not to specification, change bearing

INTERMEDIATE CASE ASSEMBLY

spacer. Use a thinner spacer to decrease end play or a thicker spacer to increase end play. Any preload on the gear bearing will cause premature bearing failure.

11 . Assemble bearing cones onto front and tear of input gear and install input gear assembly into intermediate case. Rotate to make sure it is seated properly.

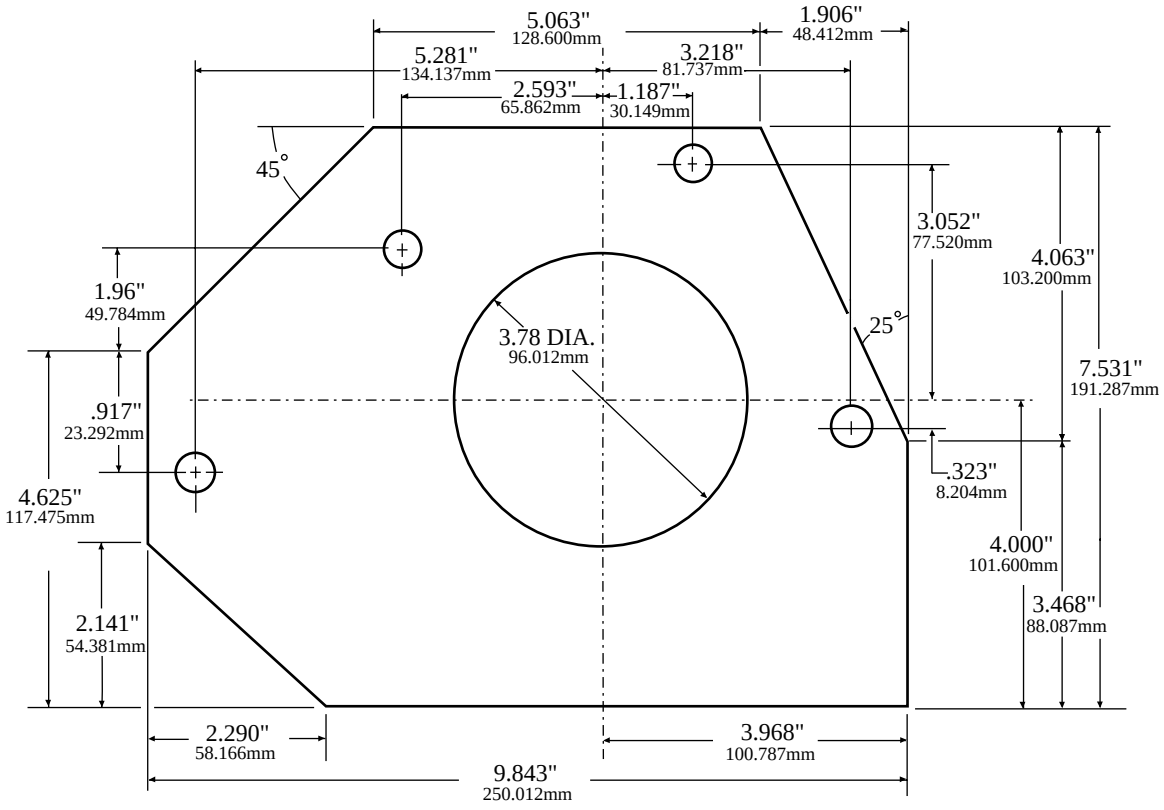
12 . Assemble shift fork onto shift collar and install into intermediate case. Be sure the boss on the shift fork is pointing up or towards the inter-axle differential before installing. Unit will not shift correctly if installed improperly.

13 . Apply Loctite #290 to threads of shift fork shaft.

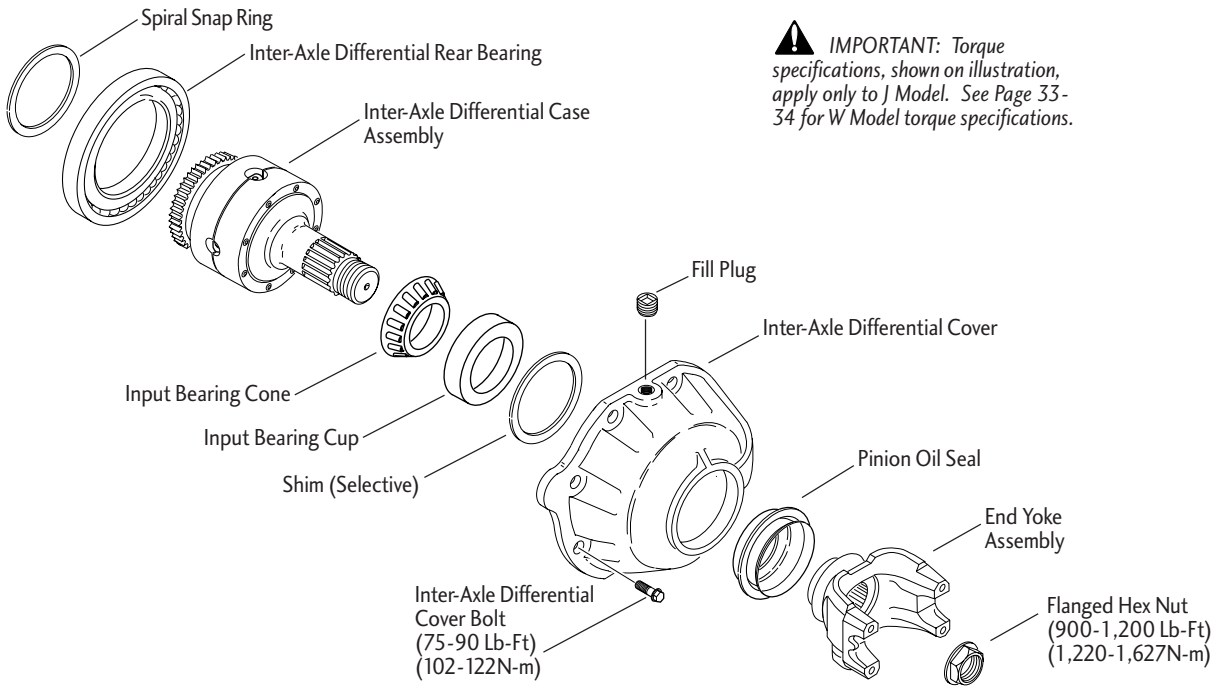
14 . Install shift fork shaft into intermediate case and thread into shift fork. Torque shaft to 30 to 38 Lb- Ft (41 -52 N-m). Place spring over shaft. Compress spring and install retainer clip into groove in shaft. Intermediate case is now ready for assembly of inter-axle differential.

Intermediate Case Assembly Complete

FABRICATE SPECIAL PLATE FROM 3/8" STEEL



INTER-AXLE DIFFERENTIAL ASSEMBLY



⚠ *IMPORTANT: Torque specifications, shown on illustration, apply only to J Model. See Page 33-34 for W Model torque specifications.*

1. Press input bearing cone onto inter-axle differential case assembly. Install bearing cup into differential cover without shims.
2. Install inter-axle differential case assembly into intermediate case. Then place the inter-axle differential cover on top of the inter-axle differential assembly. (the inter-axle differential rear bearing should not be installed at this time)
3. Secure inter-axle differential cover into place with four bolts. Bolts do not have to be torqued, but should be enough to prevent movement.
4. Position a dial indicator on input shaft of inter-axle differential. **See Figure 18**. Use a lever arm and pry differential up to measure end play. Record this dimension. Remove inter-axle cover and inter-axle differential. Remove bearing cup from cover.
5. End play for the inter-axle differential is .001-.005. From the dimension recorded in step 4, subtract .001-.005 for correct shim required.

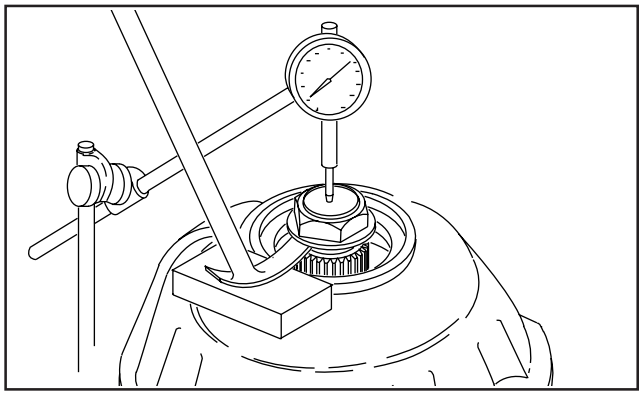


Figure 18

EXAMPLE

.080 in. (2.032 mm)	Dial indicator measurement
-.003 in. (.076 mm)	Preferred end play
.077 in. (1.956 mm)	Shims required

Install proper shim and bearing cup into inter-axle cover.

6. Press inter-axle differential rear bearing onto rear case of inter-axle differential cover.
7. Assemble spiral snap ring onto differential case. Be sure snap ring is completely seated into groove.

INTER-AXLE DIFFERENTIAL ASSEMBLY

8 . Install input seal into inter-axle cover. Apply a light coat of lubricant onto seal prior to installation. Assemble end yoke onto input shaft of inter-axle differential. Mount end yoke in vise.

9 . Clean and dry threads. Coat threads with Loctite #680 and torque nut to 900-1,200 Lb-Ft (1,220-1,627 N-m). **See Figure 19**.

10 . Apply 1/16" bead of Loctite #518 Gasket Eliminator to mating surface on rear side of input shaft bearing retainer. **See Figure 20**. Position retainer onto intermediate case. Install bolts and tighten to 75-90 Lb-Ft (102-122 N-m). Again check end play to assure proper setting.

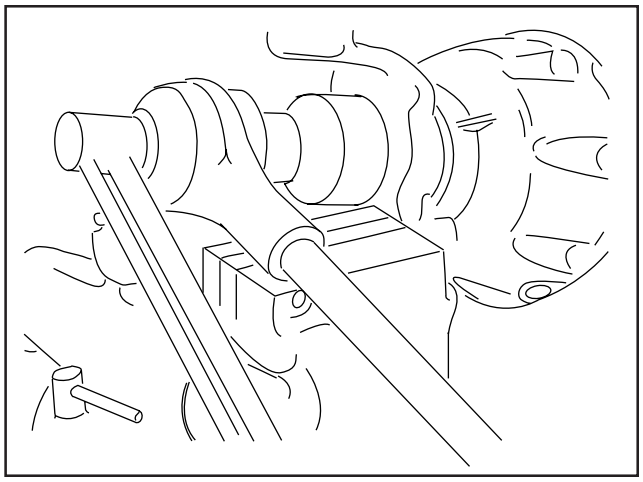


Figure 19

11 . Apply 1/16" bead of Loctite #518 Gasket Eliminator onto mounting surface next to cylinder and install onto intermediate case. **See Figure 21 .**

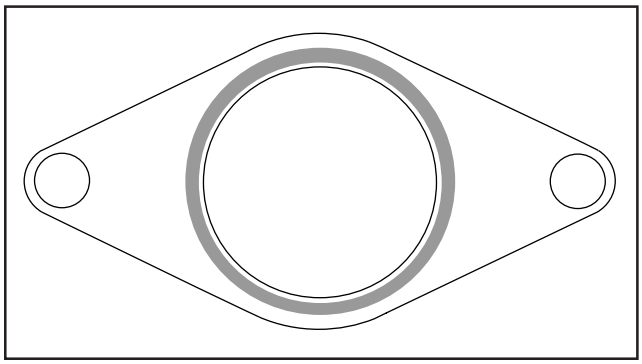


Figure 21

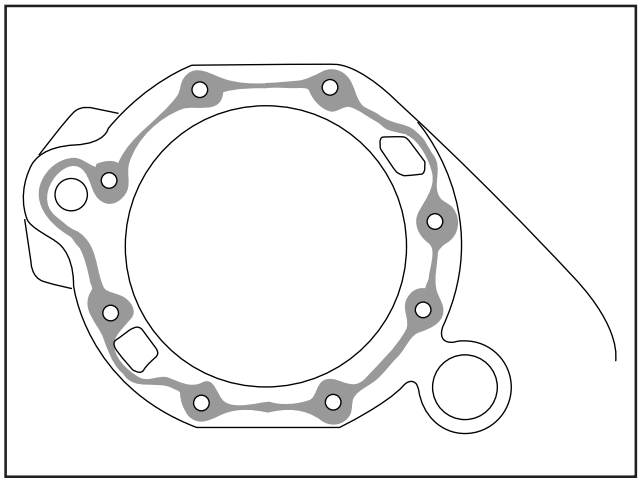


Figure 20

12 . Torque mounting bolts to 30-40 Lb-Ft (41 -55 N-m).

13 . As a check, connect air line to power divider control to be certain it is operable. There should be a distinct "clunk" sound when air is applied.

Inter-axle Differential Assembly Complete

RING GEAR AND PINION TOOTH CONTACT PATTERN

The procedures to the right are to be used to establish proper gear tooth pattern after assembly of the carrier is complete.

NOTE: If matched sets are being reused, measure and record backlash before disassembly, and reassemble to the same backlash. This will match ring and pinion gears to the established wear patterns. Hand rolled patterns will cover less area than the gear pattern established by previous service.

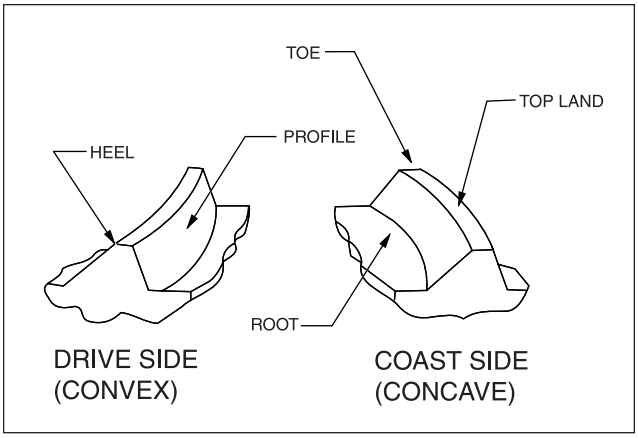
Gleason cut gears and Oerlikon cut gears can be identified by using the following chart.

Example: Gleason cut Wmodel, 584282C1.

	JModel	WModel
Gleason	047GX1XX	XXXXXXC1 XXXXXXR1
Oerlikon	------	057GX2XX

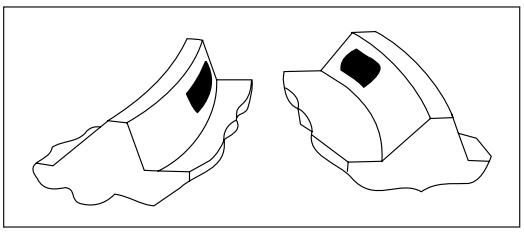
STEP 1. Paint 1/4 ring gear with marking compound on both the drive and coast side.

STEP 2. Rotate ring gear at least one complete revolution in both directions while load is being applied.

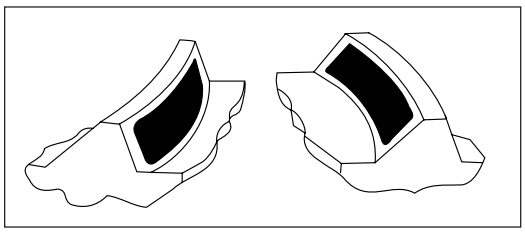


CORRECT GEAR PATTERNS FOR GLEASON CUT GEARS

LIGHTLY LOADED

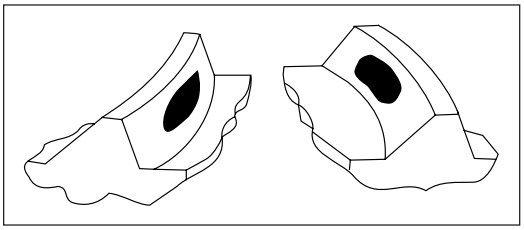


HEAVILY LOADED

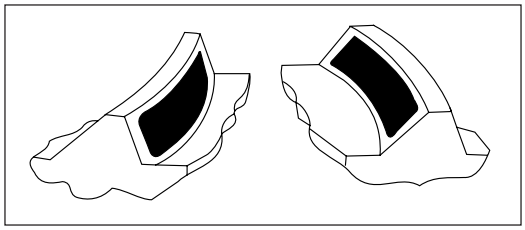


CORRECT GEAR PATTERNS FOR ORLIKON CUT GEARS

LIGHTLY LOADED



HEAVILY LOADED

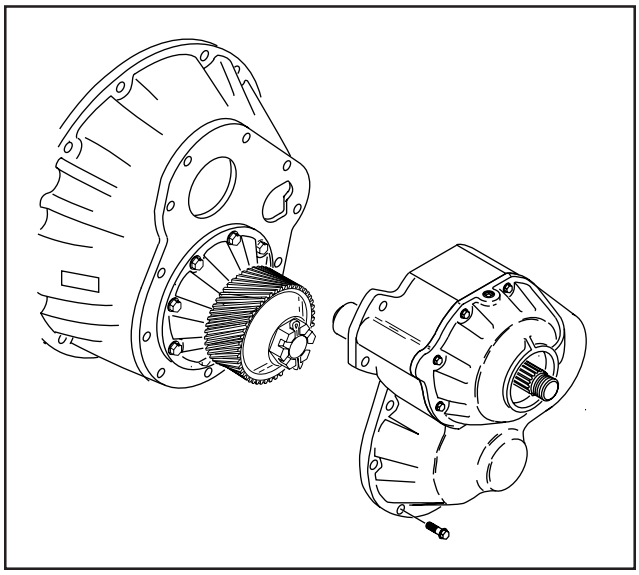


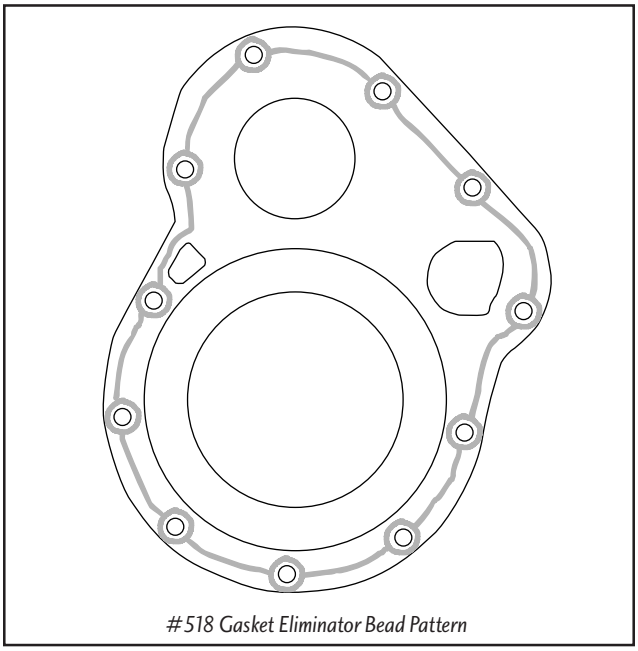
NOTE: Tooth contact pattern, on this axle model, can be moved only by adjusting backlash. The contact pattern can be moved in the direction of heel-to-toe, and toe-to-heel; Depth of the pattern cannot be adjusted. If an acceptable tooth contact patter n cannot be established within limits of backlash, contact Spicer Service at 1-800-666-8688.

INSTALLATION OF INTER-AXLE DIFFERNETIAL TO CARRIER

1 . Thoroughly clean mating face of carrier and apply an 1/8 inch bead of Loctite #518 Gasket Eliminator. **See Figure 21** for correct bead pattern.

2 . Align inter-axle differential case with carrier housing and insert bolts and torque to 160-180 Lb-Ft (217-244 N-m).





#518 Gasket Eliminator Bead Pattern

Figure 21

YOKE REMOVAL AND SEAL REPLACEMENT

1 . Disconnect drive shaft at the rear U-joint.

2 . Remove yoke nut.

NOTE: Use of torque multiplier is recommended as torque specification on input flanged hex nut is 900-1,200 Lb-Ft (1,220-1,627 N-m).

3 . Remove end yoke using the yoke remover tool. **See Figure 22.**

4 . Remove oil seal.

5 . Inspect end yoke seal surface for grooves. If grooves can be detected with fingernail, it should be repaired with a CR SPEEDI-SLEEVE® or replaced.

6 . Clean and dry threads on input/ouput shaft or pinion. Install oil seal using proper tools.

7. Install end yoke using yoke installer.

NOTE: Spicer recommends that new flanged hex nuts be used.

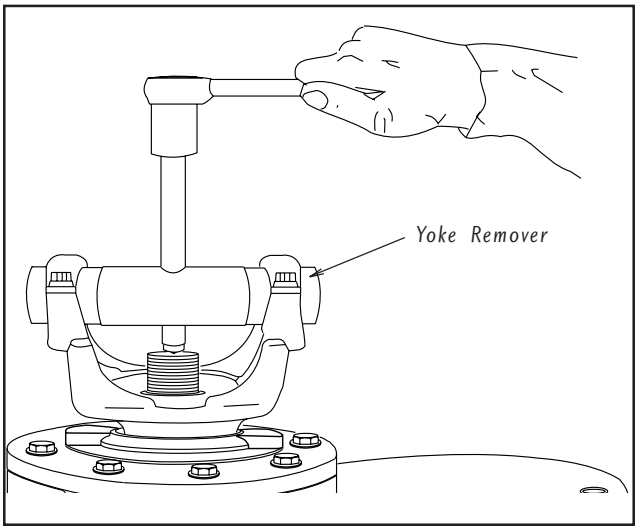


Figure 22

8 . Apply Loctite #680 (green) to threads.

9 . Use torque multiplier and torque flanged hex nut to 900-1,200 Lb-Ft (1,220-1,627 N-m).

Yoke Removal and Seal Replacement Complete

INSTALLATION OF DIFFERENTIAL CARRIER TO AXLE HOUSING

1 . Thoroughly clean the inside of the carrier housing and inspect the housing mounting surface for nicks and general cleanliness. Stone the surface if necessary to remove burrs or nicks. Bolt holes must also be checked to see that they are free of contaminants.

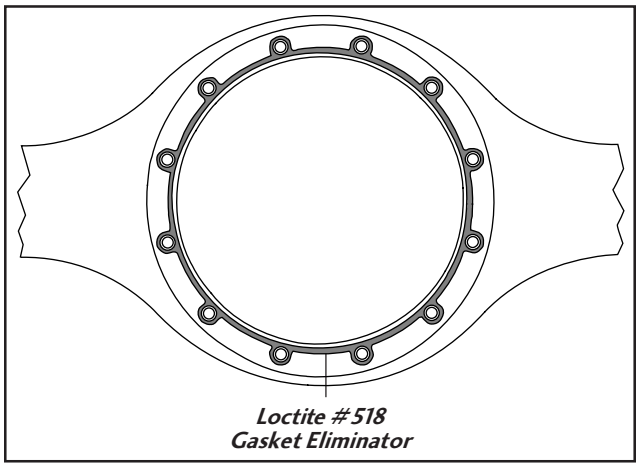
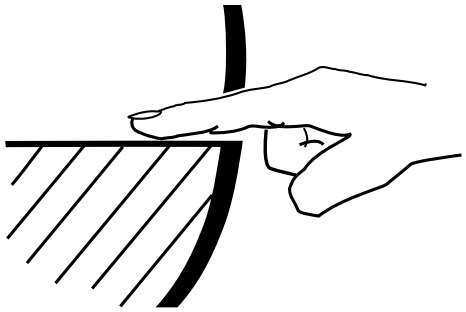


Figure 23

2. Apply an 1/8" (3.175 mm) diameter bead of Loctite #518 Gasket Eliminator onto the axle housing mounting flange and around each bolt hole. **See Figure 23.**
3. Thread two studs into the axle housing 180˚ apart. This will eliminate rotation of the carrier assembly after it makes contact with the gasket material.
4. Install the carrier assembly into the axle housing. If reinstalling used bolts, clean the mounting bolts, and coat with Loctite #277, and install. Tighten bolts evenly in a crossing pattern. Torque bolts 240-260 Lb-Ft (325-352 N-m).
5. Allow one hour cure time for gasket material before adding hypoid gear lubricant.
6. Remove the old axle flange gasket and clean mating surfaces of the hub and axle flange.
7. Install the new axle flange gasket.
8. Install the axle shafts to proper location. Torque the axle flange nuts to vehicle manufacturers specifications.
9. Clean drain plug and install. Torque drain plug to 35-45 Lb-Ft (47-61 N-m). Fill unit to proper level with hypoid gear lubricant.
10. Install fill plug and torque to 35-45 Lb-Ft (47-61 N-m).



NOTE: Lubricant close enough to bottom of fill hole to be seen or touched is not sufficient. Lubricant must be level with the fill hole.

CAPACITIES (Approximate*):

J Models	Pints	Liters
Forward Rear	**33.5**	**16.0**
Rear Rear Axle	**26.5**	**12.7**

W Models	Pints	Liters
Forward Rear	**35.5**	**16.9**
Rear Rear Axle	**28.5**	**13.6**

** Lube capacity will vary depending upon the housing angle in each vehicle. Capacities given above are for an angle of 4 degrees. Fill to the lower edge of the fill hole in the axle housing as shown above.*

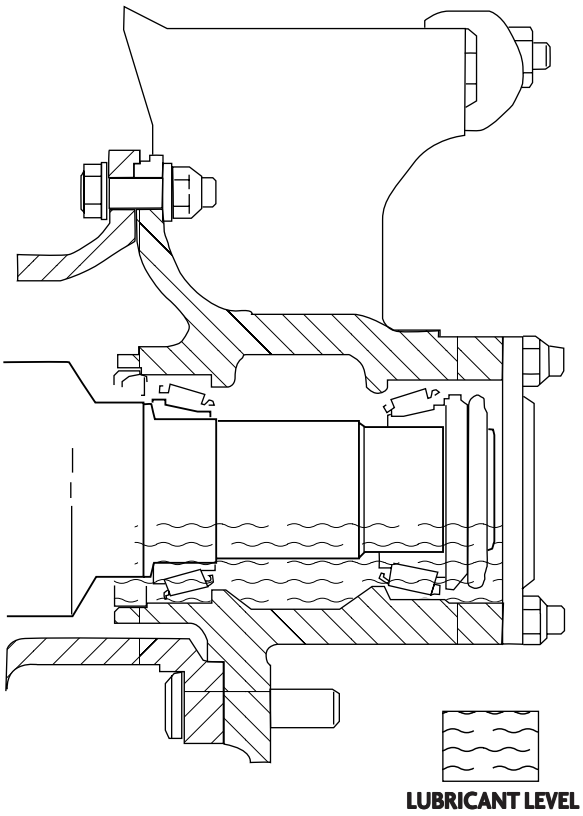
*** Pour 1 Pint (0.5 Liter) of gear lube into the filler hole in top of Inter-axle Differential cover.*

WHEEL BEARING ADJUSTMENT

NOTE: Wheel bearings should be adjusted following vehicle manufacturers recommended maintenance schedule.

1. Block wheels not being adjusted to insure that vehicle will not roll. Release emergency brake.
2. Raise wheel to be adjusted off of the ground. Make certain wheel rotates freely.
3. Remove axle shaft.
4. Remove outer adjusting nut and lock if tabs are broken.
5. Torque inner wheel nut to 50 Lb-Ft (68 N-m) while rotating wheel one direction, then the other direction. Back off inner nut 1/4 turn.

NOTE: When replacing wheel bearings, new bearings must be seated to insure maximum service reliability. After the hub and bearings are assembled in place on the spindle, install the inner adjusting nut. Tighten the inner adjusting nut to 120 - 140 Lb-Ft (163-190 N-m), while rotating the hub to seat the bearings. Back off the adjusting nut 1/2 turn and follow the procedure outlined in step #5.



6 . Install lock against inner wheel nut, with locking portion positioned on either the flat side of inner nut or peak of inner nut, as shown.

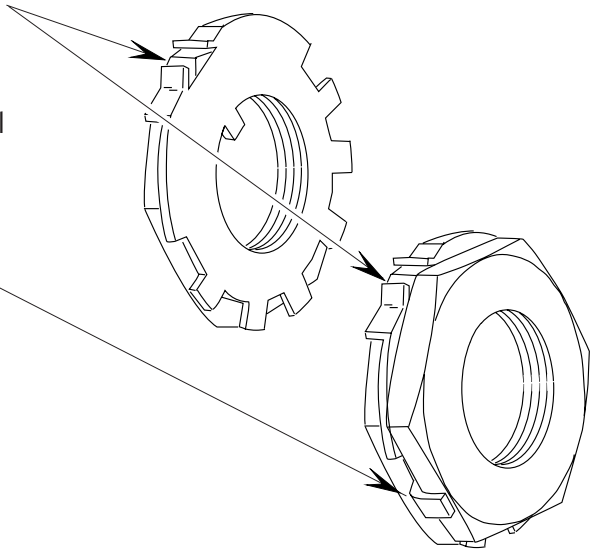
7. Install outer wheel nut and torque to 250-275 Lb-Ft (340-373 N-m). Rotate wheel in both directions. Wheel must rotate freely, without binding.

8 . Bend one tang of lock over flat portion of outer wheel to secure.

9 . Remove old axle flange gasket and clean mating surfaces of hub and axle flange.

10 . Install new axle flange gasket.

11 . Install axle shaft. Torque axle nuts to specifications. **(See Axle/Torque Specifications, Pg. 33).**



Axle Specifications				
Description	J Models		W Models	
	U.S.	Metric	U.S.	Metric
Pinion				
Nominal Dimension	3.976 in.	95.745 mm	4.2845 in.	108.826 mm
Bearing Preload (Torque Wrench)	10-30 Lb-in	1.1-3.4 N-m	10-30 Lb-in	1.1-3.4 N-m
Differential				
Ring Gear to Pinion Backlash	.010-.013 in.	.25-.33 mm	.012-.016 in.	.30-.40 mm
Ring Gear Rivet Pressure	45-50 tons	41-45 tonnes	50 tons	45 tonnes
Power Divider				
Inter-axle Differential End Play	.001-.005 in.	.03-.12 mm	.001-.005 in.	.03-.12 mm
Idler Gear Bearing End Play	.001-.006 in.	.03-.15 mm	.001-.006 in.	.03-.15 mm
Lubrication (Approx.**)				
Forward Rear Axle	33.5	16.0	35.5	16.9
Rear Rear Axle	26.5	12.7	28.5	13.6

* *Pinion bearing preload is established prior to installation of pinion seal.*
** *Capacity will vary depending on the housing angle in each vehicle. Fill to lower edge of fill hole in rear of axle housing as shown on Page 30.*
§ *Pour 1 Pint (0.5 Liter) of gear lube into filler hole in top of inter-axle differential cover.*

Axle Specifications					
Position	Model	Thread	Grade	Lb-Ft	N-m
Axle Flange to	J340-S Only	5/8-18	5 Nylok	125-145	170-195
Wheel Hub Nuts***	J380-S thru W460-S	3/4-16	5 Nylok	217-240	290-325
Axle Flange to	J340-S Only	5/8-18	8 Steel	160-185	220-250
Wheel Hub Nuts***	J380-S thru W460-S	3/4-16	8 Steel	275-320	370-435

NOTE: Refer to vehicle manufacturer specifications for axle Flange-Wheel Nut fastener torque.
*** *Axle flange mounting nuts are either a grade 5 nylon (Nylok) locking nut, or a grade 8 steel locking nut. Torque to specification shown in chart above.*

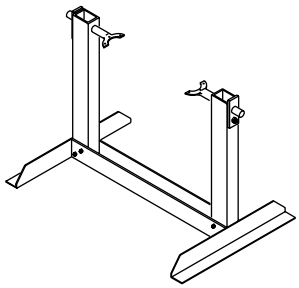
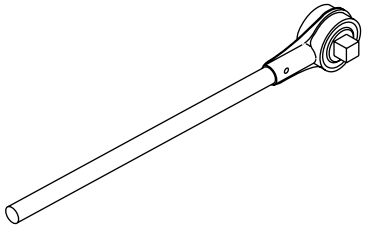
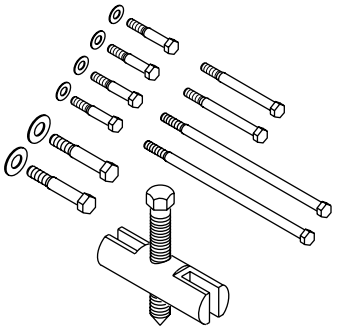
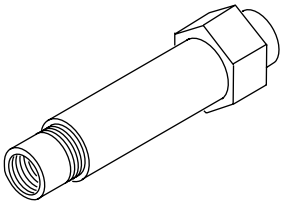
AXLE / TORQUE SPECIFICATIONS

Power Divider Fasteners				
Position	**Thread**	**Grade**	**Lb-Ft**	**N-m**
Flanged Hex Nut, Input	1 3/4-12		900-1,200	1,220-1,267
Flanged Hex Nut, Output	1 1/2-18		500-600**	680-816**
Idler Shaft Nut	1 1/4-18		500-600	680-816
Inter-axle Differential Cover Bolt (Hex)	1/2-13	8	75-90	101-122
Intermediate Case Bolts (Flanged)	1/2-13	8	75-90	101-122
Output Shaft Retainer Bolts	3/8-16	8	30-40	41-55
Shift Fork Shaft	1/2-13		30-38	41-52
Air Shift Cylinder Bolts	3/8-16	8	30-40	41-55

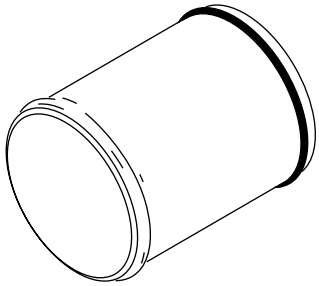
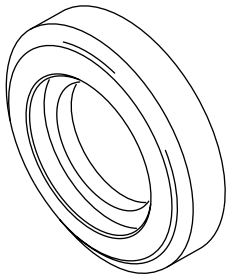
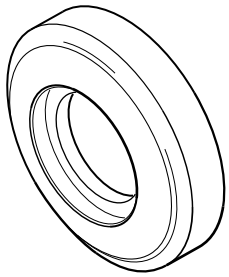
*** Threads must be cleaned and dried, and coated with Loctite#518 adhesive compound, or its equivalent.*

Forward/Rear Axle Common Fasteners					
Position	**Model**	**Thread**	**Grade**	**Lb-Ft**	**N-m**
Castillated Pinion Nut	All Fwd Carriers	1 3/4-12		600 Min.*	815 Min.*
Flanged Hex Nut, Rear	All	1 3/4-12		900-1,200**	1,220-1,627**
Pinion Bearing Cage Bolts (Hex)	All Fwd Carriers	9/16-12	5	115-135	155-183
Pinion Bearing Cage Bolts (Hex)	All	5/8-11	5	160-180	218-245
Pinion Bearing Cage Bolts (Flanged)	All	5/8-11	8	240-260	326-352
Differential Bearing Cap Bolts (Hex)	All	3/4-10	5	275-320	373-433
Differential Bearing Cap Bolts (Flanged)	All	3/4-10	8	295-340	400-460
Differential Case Nuts	J	9/16-18	8	115-135	155-183
Differential Case Nuts	W	5/8-18	8	160-180	218-245
Carrier Mounting Bolts (Hex)	All	5/8-11	5	160-180	218-245
Carrier Mounting Bolts (Flanged)	All	5/8-11	8	240-260	326-352
Differential Case Oil Scoop Bolts	All	1/4-20	8	7-9	9-12
Oil Pipe Plugs	All	3/4-14	8	35-45	47-61
Ring Gear Bolt Kit	All	M16 x 1.5-6G		300-320	406-434

** If roll pin cannot be installed after minimum torque is attained, the nut must be advanced until roll pin can be installed.*
*** Threads must be cleaned and dried, and coated with Loctite#518 adhesive compound, or its equivalent.*

ORDER NUMBER	ILLUSTRATION	DESCRIPTION
DST1001		CARRIER STAND
DST1002 DST1003 DST1004 DST1005		TORQUE MULTIPLIERS Maximum 1,000 Lb-Ft Maximum 2,000 Lb-Ft Maximum 4,000 Lb-Ft Maximum 12,000 Lb-Ft
DST1006		YOKE REMOVER, BAR TYPE
DST1009		INSTALLER, DIFFERENTIAL YOKE ($1^{1/4}$"- 12)

RECOMMENED SERVICE TOOLS

DST1010 J340-S,J380-S,J400-S,W440-S,W460-S TANDEM AXLE KIT		
ORDER NUMBER	ILLUSTRATION	DESCRIPTION
DST1000-1		SEAL INSTALLATION HANDLE (To be used with seal installers below)
DST1000-2		INPUT/OUTPUT SHAFT SEAL INSTALLER
DST1000-3		LUBE RETAINER & REAR PINION SEAL INSTALLER

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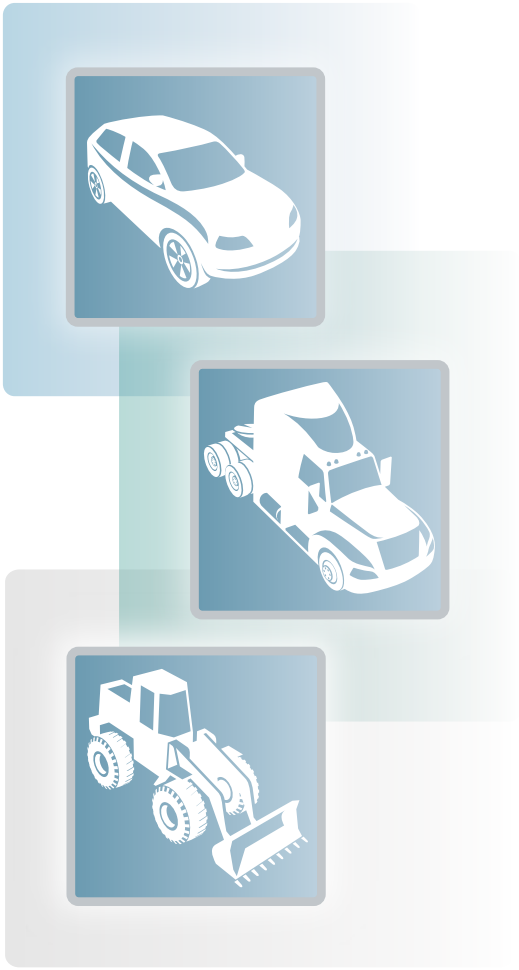

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